SOUTHERN CALIFORNIA EDISON

Bishop Creek Hydroelectric Project

(FERC Project No. 1394)

DRAFT LICENSE APPLICATION

EXHIBIT E

SOUTHERN CALIFORNIA EDISON

An EDISON INTERNATIONAL® Company

January 2022

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Bishop Creek Hydroelectric Project
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Draft License Application
EXHIBIT E

Southern California Edison
1515 Walnut Grove Ave
Rosemead, CA 91770

January 2022

Support from:

Kleinschmidt

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1.0 INTRODUCTION

Southern California Edison Company (SCE) is the licensee, owner, and operator of the Bishop Creek Hydroelectric Project (Bishop Creek Project or Project), Federal Energy Regulatory Commission (FERC) Project No. 1394 located on Bishop Creek near the community of Bishop in Inyo County, California. Bishop Creek Project facilities are located within the Inyo National Forest (INF) and the John Muir Wilderness (managed by the U.S. Forest Service [USFS]), and include lands managed by Bureau Land Management (BLM) and private lands. The Bishop Creek Project consists of five developments: power plants 2 through 6 on the Middle Fork of Bishop Creek and three primary storage reservoirs that include South Lake, Lake Sabrina and Longley Lake. The Bishop Creek Project also utilizes diversions and flowlines that collect water from Green Creek (a tributary to Bishop Creek), Birch Creek, and McGee Creek. SCE currently operates the Bishop Creek Project under a 30-year license that was issued by FERC on July 19, 1994. Because the current license will expire on June 30, 2024, SCE is seeking a license renewal to continue operation and maintenance (O&M) of the Bishop Creek Project. Figure 3.1.1-1 below provides an overview of the location, and general layout of the facilities relative to the Federal Energy Regulatory Commission (FERC) boundary.

The Bishop Creek Project has a total dependable generating capacity of 28,922 kilowatts (kW) and has an average annual energy production of 246,271 megawatt hours (MWh). Stored water is transported through a series of connecting flowlines and penstocks to the plants and then returned to the river through the tailrace at Plant No. 6. Under the existing Project license, the FERC Project boundary encompasses 1082.2 acres, including 781.4 acres of federal lands administered by either the U.S. Department of Agriculture (USDA) Forest Service or the BLM, and 300.9 acres of SCE-owned or private land. SCE does not propose any changes to Project O&M and does not propose any new construction.

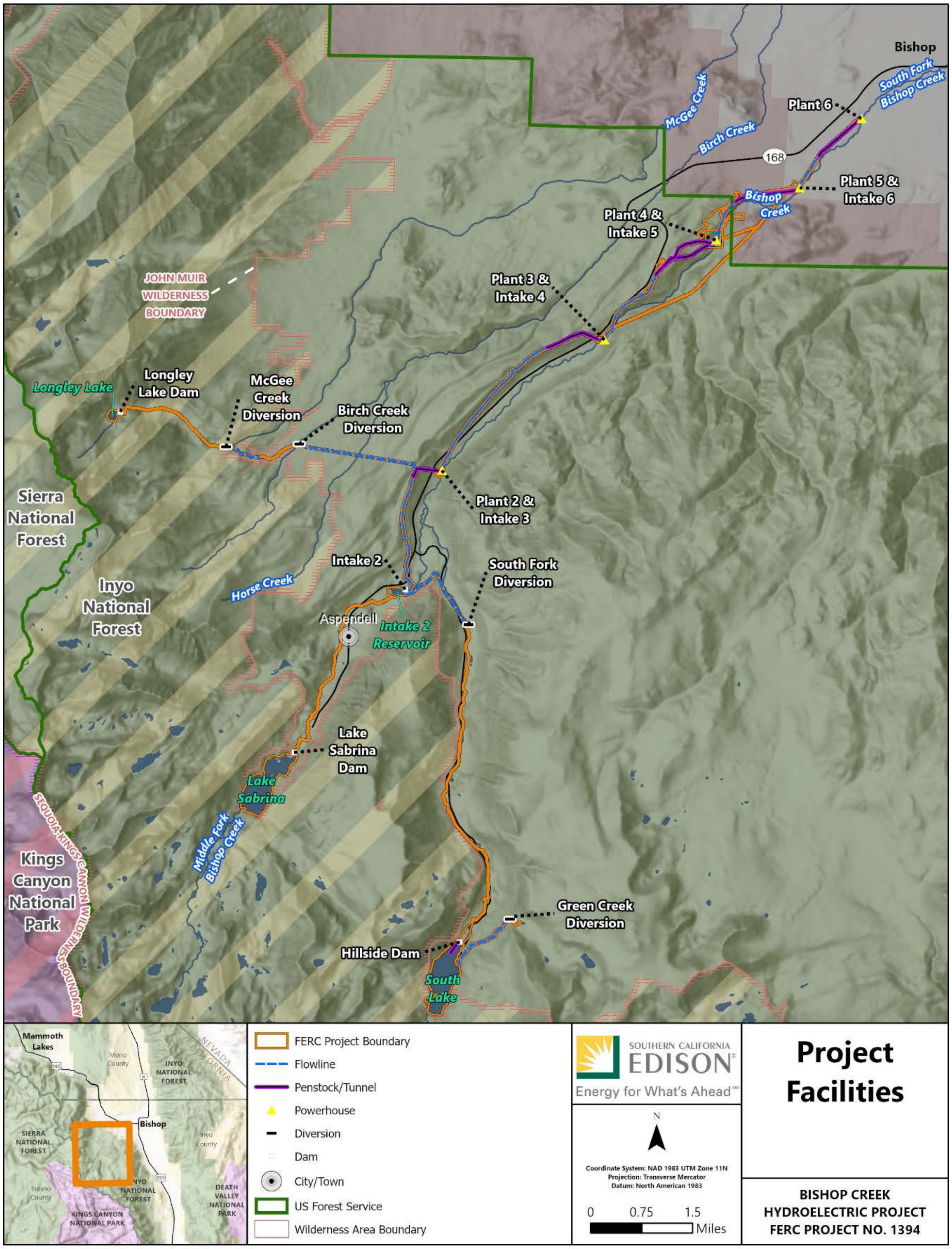

Figure 1.1-1. Project Location, FERC Boundary, and Facilities.

2.0 APPLICATION

SCE is applying to FERC for a new license for the existing Bishop Creek Project. This draft Application for New License for Major Project – Existing Dam (License Application) was filed on or about January 27, 2022, pursuant to FERC regulations at Title 18 of the Code of Federal Regulations (CFR) §5.16 and §5.18. This Exhibit E – Environmental Exhibit was prepared by SCE in support of the License Application. SCE is using the Integrated Licensing Process (ILP) to develop this License Application.

Bishop Creek Project is designated as FERC Project No. 1394, pursuant to the license issued on July 19, 1994, but effective on July 1, 1994, for a period of 30 years, terminating on June 30, 2024. Through submittal of this License Application, SCE requests renewal of its license to continue O&M of the Bishop Creek Project with a license term of 40 years.

The exact name and business address of SCE is as follows:

Southern California Edison Company
2244 Walnut Grove Avenue
Rosemead, CA 91770
Telephone: (626) 302-9741

The exact name and business address of the person authorized to act as agent for SCE in this application is:

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3.0 PURPOSE AND NEED FOR POWER

3.1 PURPOSE OF ACTION

SCE proposes to continue the O&M of the Bishop Creek under the Federal Power Act (FPA). If FERC issues a new license, a key component is the conditions placed in the Bishop Creek Project license to ensure compliance with the FPA and other applicable laws. In deciding whether to issue a license, FERC must determine that the Bishop Creek Project, would be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and development purposes for which licenses are issued (e.g., flood control, irrigation and water supply), FERC must give equal consideration to the purposes of energy conservation; the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); protection of recreational opportunities; and preservation of other aspects of environmental quality.

The Draft License Application (DLA) was prepared in compliance with 18 CFR Part 5, which defines the form and content requirements of the document. The purpose of the DLA is to provide FERC, federal and state agencies, and other interested stakeholders with information related to Bishop Creek Project facilities and engineering, operational, economic, and environmental aspects of the Project. This Environmental Exhibit (Exhibit E) provides the information necessary for FERC to develop new license conditions for the Bishop Creek Project. The Exhibit E presents a description and analysis of the environmental and economic effects of the Proposed Action and the No-Action Alternative. Several other alternatives were considered in Exhibit E but eliminated from detailed analysis because they were not considered reasonable, including federal government takeover; issuance of a non-power license; and retirement of the Bishop Creek Project (refer to section 7.0, Other Alternatives).

3.2 NEED FOR POWER

SCE is a public utility that supplies electricity to approximately 15 million people in a 50,000 square mile service area covering portions of coastal, central, and southern California. SCE serves all customers through a diverse transmission system and has a generation mix based on several different resources, such as gas, nuclear, and hydroelectric. SCE also purchases power from other utilities or non-utility power producers.

The Bishop Creek Project utilizes water from Bishop Creek and its tributaries for water storage and power generation. The water scheduling priority is based on the requirements of a 1922 water rights ruling *(Hillside Water Company v. William A. Trickey et.al,* herein referred to as the "Chandler Decree") and with wintertime flows regulated by the 1933 Sales Agreement (Sales Agreement) between Southern Sierra Power Company (predecessor to SCE) and the LADWP.

3.2.1 POWER DEMAND

The North American Electric Reliability Corporation (NERC) is a regulatory authority whose mission is to assure effective and efficient reduction of risks to the reliability and security of the power grid. NERC develops and enforces reliability standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel (NERC 2019).

There are seven regional entities given authority by the NERC. Of those entities, the Western Electricity Coordinating Council (WECC) is responsible for coordinating and promoting Bulk Electric System reliability in the Western Interconnection. The Western Interconnection includes all or portions of 14 western states, two Canadian provinces, and a portion of Baja California in Mexico. SCE's service area is within the California/Mexico sub region of the Western Interconnection.

According to WECC forecasts for the Western Interconnection, demand is projected to increase by approximately 7 percent from 2020 to 2029. The summer peak demand is expected to increase by 9.0 percent during that same period (WECC 2021). The region has a need for power over the near term, and power from the Bishop Creek Project would continue to help meet that need in the future. In addition to underlying demand growth, uncertainty surrounds projections of future energy demand and planned capacity due to ongoing changes in the electric industry's governing regulatory structure, changes in the resource mix (i.e., environmental regulations driving development of clean energy sources and increased reliance on natural gas), and in some years, climatic conditions such as higher temperatures, drought, and extreme weather.

3.2.2 CALIFORNIA LEGISLATION

Regulation of greenhouse gas (GHG) emissions in the United States and California is relatively recent, beginning early in the 2000s. In the absence of major federal efforts, former California governor Arnold Schwarzenegger and the state legislature took the initiative to establish goals for reductions of GHG emissions in California and to prescribe a regulatory approach to ensure that the goals would be achieved. The federal government, primarily through actions of the U.S. Environmental Protection Agency (USEPA), also regulates GHG emissions, although not as comprehensively.

California has continued to pursue extensive climate change policies. On September 8, 2016, former Governor Jerry Brown signed Senate Bill (SB) 32, which extends the state's target to reduce GHG emissions. The Bill mandates a 40 percent reduction in GHG emissions below 1990 levels by 2030 and essentially builds upon the Assembly Bill (AB) 32 GHG reduction target to reduce GHG to 1990 levels by 2020. To achieve the SB 32 reductions, the plan is to increase renewable energy use, improve energy efficiency, get more zero emissions vehicles on California's roadways, and curb emissions from key industries (State of California 2019). By 2017, California's emissions were already below the 2020 target; however, the rate of reductions must continue to decrease to reach the SB 32 target by 2030 (Petek 2020).

In addition, SB 350 increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030. This will increase the use of Renewables Portfolio Standard eligible resources, including solar, wind, biomass, geothermal, and others. SB 350 requires the state to double statewide energy efficiency savings in electricity and natural gas end uses by 2030. To help ensure these goals are met and GHG emission reductions are realized, large utilities will be required to develop and submit Integrated Resource Plans (IRP). These IRPs will detail how each utility will meet their customers resource needs, reduce GHG emissions, and ramp up the deployment of clean energy resources (CEC 2019).

California's long-germ goal is to become carbon neutral by 2045, following Executive Order (EO) B-55-18 by Governor Gavin Newsom and the passage of SB 100 (CARB 2019).

Energy generated by the Bishop Creek Project displaces energy that would otherwise be generated by gas-fired units. Currently, aside from power generated by its own sources, SCE purchases the power needed to serve its customers from qualifying facilities, independent power producers, the California Independent System Operator, the California Department of Water Resources (under contracts with other third parties), and other utilities. If Bishop Creek Project is not relicensed, SCE would need to obtain replacement low-GHG emitting energy supplies to comply with SB 32. SCE is already attempting to purchase more energy from clean renewable resources to meet state of California renewable portfolio standards.

In summary, energy produced from Bishop Creek Project is used by SCE to: (1) meet current demand for energy in its service area; (2) meet renewable energy goals; and (3) provide a source of energy with low-GHG emissions.

3.3 References

California Air Resources Board (CARB). 2019. Available at: https://ww2.arb.ca.gov/news/governor-newsom-announces-climate-pollution-continues-drop-below-2020-target-while-states. Accessed May 14, 2021

California Energy Commission (CEC). 2019. Available at: https://www.energy.ca.gov/sb350/. Accessed May 14, 2021

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Petek, Gabriel. 2020. Assessing California's Climate Policies – Electricity Generation. Legislative Analyst's Office. Available at: https://lao.ca.gov/reports/2020/4131/climate-policies-electricity-010320.pdf. Accessed May 14, 2021

State of California. 2019. California Climate Change Legislation. Available at: https://www.climatechange.ca.gov/state/legislation.html. Accessed May 14, 2021

Western Electricity Coordinating Council (WECC). 2021. Generation Resource Adequacy Forecast 2020-2029. Available at: https://www.wecc.org/ePubs/GenerationResourceAdequacyForecast/Pages/Introduction.aspx. Accessed May 14, 2021.

4.0 STATUTORY, REGULATORY REQUIREMENTS AND APPLICABLE LAWS

4.1 FEDERAL POWER ACT

FERC is the lead federal agency for regulating the licensing of the Bishop Creek Project and the evaluating the Proposed Action as outlined in the Final License Application (FLA). Consistent with FPA, FERC will consider the following sections of the FPA.

4.1.1 SECTION 4(E)

Section 4(e) of the FPA provides that any license issued by FERC for a project within a federal reservation shall be subject to and contain conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The USFS is the primary federal land manager for much of the Bishop Creek Project area. FERC will solicit these conditions after the FLA is filed.

4.1.2 SECTION 10(J) RECOMMENDATIONS

Under Section 10(j) of the FPA, each license issued by FERC shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement (PME) of fish and wildlife resources affected by the project. FERC is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable laws. Before rejecting or modifying an agency recommendation, FERC is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. FERC will solicit these recommendations after the FLA is filed.

4.1.3 SECTION 18 FISHWAY PRESCRIPTIONS

Section 18 of the FPA states that FERC is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the Interior. FERC will solicit these prescriptions after the FLA is filed.

4.2 CLEAN WATER ACT

In 1948, Congress passed the Federal Water Pollution Control Act (FWPCA) for the purpose of restoration and maintenance of chemical, physical, and biological integrity of the Nation’s waters (33 United States Code (USC) §1251(a)). The Clean Water Act (CWA) of 1972 amended and expanded the FWPCA. The CWA, administered by the USEPA, establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating water quality standards for surface waters.

4.2.1 SECTION 401

Section 401 of the CWA states that any applicant for a federal license or permit to conduct any activities which may result in any discharge into navigable waters requires the applicant to request certification from the state in which the discharge will originate. No federal license or permit shall be granted until the water quality certification (WQC) required by the CWA Section 401 has been obtained from the state agency authorized to administer the CWA, unless the state agency waives the requirement for a certification. If a certification is issued, the conditions set forth in a WQC become conditions of the FERC license and FERC must include them in their final Order (USEPAa n.d).

As required by 18 CFR 5.23(b), SCE intends to file, no later than 60 days following the date of FERC's issuance of its notice of acceptance and ready for environmental analysis of the SCE FLA: (1) a copy of the water certification; (2) a copy of the request for certification, including proof of the date on which the certifying agency received the request; or (3) evidence of waiver of WQC.

4.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.

SCE's review of readily available information, and early consultation with interested parties and agencies have not identified impacts to any rare, threatened, or endangered (RTE) species associated with the Bishop Creek Project.

Consultation is required under Section 7 of the ESA as part of the FERC process. Federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat for these listed species. Jeopardy exists when an action would "reduce appreciably the likelihood of both the survival and recovery of a listed species...." (50 CFR § 402.02).

FERC initiated informal consultation with the USFWS and NMFS under Section 7 of the ESA on June 27, 2019, by designating the SCE as the non-federal representative for informal consultation under Section 7. Since this designation, SCE has held workshops and conference calls with agencies responsible for implementing ESA consultation to better evaluate possible impacts to those species potentially impacted by the Proposed Action.

Discussion of the Bishop Creek Project's effects on threatened and endangered species are provided in Section 8.8 - Rare, Threatened, Endangered, and Special Status Species Affected Environment of this Exhibit E.

4.4 Magnuson Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires federal agencies to consult with National Oceanic and Atmospheric

Administration (NOAA) Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH).

On June 27, 2019, FERC designated SCE as the non-federal representative for execution of informal consultation under Section 305(b) of the Magnusson-Stevens Act. SCE reviewed EFH designations for the west coast (NOAA, 2021) and determined that the Proposed Action will not adversely affect designated EFH.

4.5 COASTAL ZONE MANAGEMENT ACT

Under Section 307 (c)(3)(A) of the Coastal Zone Management Act (CZMA), FERC cannot issue a license for a project within or affecting a states' coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification. The California Coastal Commission is the agency responsible for implementing California's coastal management program.

The Bishop Creek Project is not included within and does not affect California's coastal zone or resources. Therefore, the Bishop Creek Project is not subject to coastal zone management review and no consistency certification is needed for FERC's relicensing of the Bishop Creek Project. SCE anticipates received concurrence from the California Coastal Commission that FERC's relicensing of the Bishop Creek Project will not affect California's coastal zone, pursuant to 18 CFR § 5.18(b)(3)(iv); this concurrence will be filed as part of the FLA.

4.6 NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the National Historic Preservation Act (NHPA) requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties and objects significant in American history, architecture, engineering and cultural resources that are eligible for inclusion on the National Register of Historic Places (NRHP).

On June 26, 2018, SCE extended invitations to participate in the relicensing process with tribes; a Cultural Technical Working Group (TWG) was formed and an invitation to other federal and state agencies, tribes, local jurisdictions, and other interested parties to participate was distributed on May 25, 2018. FERC initiated consultation with the California State Historic Preservation Officers (SHPO) on June 27, 2019, by designating SCE its "non-federal representative for carrying out consultation" pursuant to 36 CFR § 800.2(c)(4). SCE continues to meet with the TWG and is preparing an Historic Properties Management Plan (HPMP), which will be filed as part of the FLA. Consultation with SHPO is ongoing through the development of the HPMP.

4.7 WILD AND SCENIC RIVERS ACT

Section 7(a) of the Wild and Scenic Rivers Act requires federal agencies to make a determination as to whether the operation of the project under a new license would invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated river corridor. Bishop Creek is not designated as a wild and scenic river along any portion of its length.

Section 4(c) of the Wilderness Act of 1964, 16 USC 1133(c) prohibit any commercial enterprise, structure, or installation within designated wilderness areas, except for existing private rights or activities authorized by the President.

The 907 square mile John Muir Wilderness Area was established by Congress as part of the original Wilderness Act of 1964, although it has been renamed and expanded since its original designation.[1] Approximately 61.1 acres of John Muir Wilderness Area lands are included within the FERC-designated Project boundary for the Bishop Creek Project, and two Project works, Longley Lake and an associated flowline, are in the John Muir Wilderness Area.

The Bishop Creek Project was licensed, constructed, and developed prior to Congress' enactment of the Wilderness Act and designation of John Muir Wilderness Area. FERC's predecessor agency, the Federal Power Commission (FPC), issued an original license for the Bishop Creek Project to the Nevada-California Electric Corporation in 1940 (2 FPC 686). In 1960, the FPC confirmed and clarified the extent of the federal power-site reservation applicable to the Bishop Creek Project under Section 24 of the FPA, and all lands later included within the John Muir Wilderness Area are subject to this power-site reservation as delineated on the then-applicable license Exhibits J and K. In addition to the Section 24 power-site reservation and FPA licenses that date to 1940, SCE has historic and existing private rights to utilize certain Bishop Creek Project resources, including appropriative water rights (Applicant IDs S007762, A001484, and A001485).

Consistent with the preservation of existing private rights under Section 4(c) of the Wilderness Act, FERC has held that while it is prohibited from issuing licenses authorizing construction of new project works within a Congressionally designated wilderness area,[2] it is not prohibited from relicensing an existing project within a Congressionally established wilderness area for projects that pre-date the designation of the wilderness area.

FERC's relicensing of the Bishop Creek Project would not be inconsistent with the Wilderness Act. Although some Project lands and Project works are within the John Muir

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[1] See Pub. L. 98-425, 98 Stat 1620 (Sept. 28, 1984) (adding 81,000 acres); and Pub. L. 111-11, 123 Stat 1063, 1064 (March 30, 2009) (adding 70,411 acres).

[2] See, e.g., Thornton Lake Resource Co., 50 FERC ¶ 61,086 (1990); S. Cal. Edison Co., 78 FERC ¶ 61,109, at p. 61,385 (1997).

Wilderness Area, the Bishop Creek Project predates the designation of that wilderness area, and SCE has held existing private rights associated with these lands and works that predate Congress' designation of the John Muir Wilderness Area. In addition, consistent with FERC precedent, SCE's relicensing application does not seek construction of any new Project works within John Muir Wilderness Area.

4.8 STATE AND LOCAL REGULATIONS

4.8.1 CALIFORNIA ENDANGERED SPECIES ACT

The California Endangered Species Act (CESA) which is enforced by the California Department of Fish and Game (CDFW). While the provisions of the CESA are similar to the ESA, CDFW maintains a list of California threatened and endangered species, independent of the ESA threatened and endangered species list. The list also includes species that are considered rare and candidates for listing, which also receive protection. The California list of endangered and threatened species is contained in Title 14, Sections 670.2 (plants) and 670.5 (animals) of the California Code of Regulations.

State-listed threatened and endangered species are protected under provisions of the CESA. Activities that may result in the take of individuals (defined in CESA as acts to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") are regulated by the CDFW. While habitat degradation or modification is not included in the definition of take under CESA, the CDFW has interpreted take to include the destruction of nesting, denning, or foraging habitat necessary to maintain a viable breeding population of protected species.

If it is determined that the take would not jeopardize the continued existence of the species, an Incidental Take Permit (ITP) could be issued by CDFW per Section 2081 of the California Code of Regulations. If a state-listed species is also federally listed, and the USFWS has issued an ITP, the ITP issued by USFWS would satisfy CDFW's requirements; CDFW may issue a consistency finding in accordance with Section 2080.1 of the California Fish and Game Code.

4.8.2 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Office of Planning and Research (OPR) and the California Natural Resources Agency serve as the administrators of the California Environmental Quality Act (CEQA). CEQA applies to all discretionary projects proposed to be conducted or approved by a California public agency, including private projects requiring discretionary government approval. For the Proposed Action, the State Water Resources Control Board (SWRCB) is the lead agency for CEQA compliance and will prepare CEQA findings and statements of overriding considerations along with its decision on the WQC issued for the Project's relicensing.

4.9 Public Review and Comment

4.9.1 Scoping

FERC, in accordance with the ILP Regulations of 18 CFR §5.8, is responsible for scoping the environmental analysis that will be undertaken in evaluating the Application for New License. Scoping is the process used to identify issues, concerns, and opportunities for enhancement or mitigation associated with a Proposed Action.

Scoping Document 1 (SD1) was released June 27, 2019, within 60 days of SCE's filing of its Notice of Intent (NOI) and Pre-Application Document (PAD). Two scoping meetings were held for the Bishop Creek Project in response to SD1 on July 30 and July 31, 2019.

On August 29, 2019, SCE filed a Revised Technical Study Plan (TSP) based on stakeholder comments received during the scoping process. Based on extensive early consultation with stakeholders, on September 4, 2019, SCE filed a letter requesting a waiver of CFR 18 CFR §5.11 (Potential Applicant's Proposed Study Plan and Study Plan Meetings) and §5.12 (Comments on the Proposed Study Plan) to expedite the study plan process. SCE requested the expedited process to allow more time for SCE and the stakeholders to collaboratively assess the Bishop Creek Project effects and develop proposed license conditions during the pre-filing period. FERC approved the waiver on October 3, 2019. A Study Determination was issued from FERC on November 4, 2019, finalizing the study plan development process.

4.9.2 Comments on the Application

SCE will file its FLA by June 30, 2024. As required by 18 CFR 5.23(a), comments, protests, interventions, recommendations, and preliminary terms and conditions or preliminary fishway prescriptions must be filed no later than 60 days after the FERC's Notice of Acceptance and Ready for Environmental Analysis (REA Notice). All reply comments must be filed within 105 days of the Notice of Acceptance and REA Notice.

Following submission of this DLA, SCE intends to hold a meeting with interested stakeholders and federal and state resources agencies. Written comments received on this DLA will be included and addressed in SCE's FLA.

4.10 References

Environmental Protection Agency (USEPAa) n.d. Clean Water Act Section 401: State Certification of Water Quality | Overview of Certification under Section 401 of the Clean Water Act.

NOAA Fisheries, 2021. Essential Fish Habitat Mapper, available at https://www.habitat.noaa.gov/apps/efhmapper/?page=page_4; accessed July 13, 2021.

5.0 NO-ACTION ALTERNATIVE

The No-Action Alternative for SCE's Bishop Creek Hydroelectric Project would continue to operate and maintain the Project under the terms and conditions of the current FERC license. This section was developed to meet the requirements for the description of the existing Project as specified in Title 18 of the CFR §5.18(b)(4). The description of the No-Action Alternative is organized into the following major subsections:

- Project Overview
- Existing Project Facilities
- FERC Project Boundary
- Project Maintenance
- Project Operations
- Project Generation and Outflow Records
- Existing Environmental Measures
- Other SCE Company-wide Environmental Programs

5.1 PROJECT OVERVIEW

SCE is the licensee, owner, and operator of the Bishop Creek Project, FERC Project No. 1394, located on Bishop Creek near the community of Bishop in Inyo County, California. Bishop Creek Project facilities are located within the (INF) and the John Muir Wilderness (managed by the USFS), lands managed by BLM, and on private lands. SCE currently operates the Bishop Creek Project under a 30-year license that was issued by FERC on July 19, 1994. Because the current license will expire on June 30, 2024, SCE seeks a license renewal to continue O&M of Bishop Creek Project. The Bishop Creek Project consists of five developments: Plant No. 2 through No. 6 on the Middle Fork of Bishop Creek and two primary storage reservoirs that include Southlake reservoir and Lake Sabrina with Longley Lake providing a small amount of storage. Additional reservoirs include Weir Lake, Bluff Lake, and Intake reservoir no. 2. The Bishop Creek Project utilizes diversions and flowlines that collect water from Green Creek (a tributary to Bishop Creek), Birch Creek, and McGee Creek.

5.2 EXISTING PROJECT FACILITIES

The Bishop Creek Project facilities are located in the Owens Valley and in areas of the eastern Sierra Nevada in Inyo County, southwest of the City of Bishop, California. Bishop Creek Project's facilities are sited along Bishop Creek and its tributaries including South Fork, Middle Fork, Green Creek, Birch Creek, and McGee Creek. Bishop Creek is a tributary to the Owens River.

The Bishop Creek Project consists of 2 primary reservoirs, 13 dams/diversions, 5 plants with a combined installed generating capacity of 28,922 kW.

5.2.1 Plants

Bishop Creek Project diverts water for power generation from the Middle and South forks of Bishop Creek, McGee Creek, and Birch Creek through the five plants and associated intakes as follows:

- Plant No. 2, with a maximum dependable operating capacity of 7,320 kW, located immediately below the confluence of the Middle and South forks of Bishop Creek
- Plant No. 3, with a maximum dependable operating capacity of 8,250 kW, located approximately 3 miles below Plant No. 2
- Plant No. 4, with a maximum dependable operating capacity of 7,950 kW, located approximately 3 miles below Plant No. 3
- Plant No. 5, with a maximum dependable operating capacity of 3,800 kW, located approximately 1 mile below Plant No. 4
- Plant No. 6, with a maximum dependable operating capacity of 1,600 kW, located approximately 2 miles below Plant No. 5

Additional details regarding the plants are included in Table 5.2-1. Figure 5.2-1 illustrates the location of the Bishop Creek Project Plants.

Table 5.2-1. Project Plants

	Plant No. 2	Plant No. 3	Plant No. 4	Plant No. 5	Plant No. 6
Dependable Operating Capacity (kW)	7,320	8,250	7,952	3,800	1,600
Type of Turbines	Pelton Single-jet	Pelton Single-jet	Pelton Single-jet	Francis	Pelton Single-jet
Horsepower	11,150	12,000	14,700	5,700	2,850
Design Head	All units: 875	All units: 730	All units: 1,053	Unit 1: 382; Unit 2: 350	220
R.P.M.	All units: 300	All units: 300	Units 1-2: 450; Units 3-5: 400	Unit 1: 600; Unit 2: 720	164
Minimum Turbine Flows	5 cfs	6 cfs	2 cfs	41 cfs	9 cfs
Minimum Load	255 kw	250 kw	115 kw	1025 kw	155 kw
Maximum Combined Flow Hydraulic Capacity	120 cfs	164 cfs	125 cfs	131 cfs	148 cfs

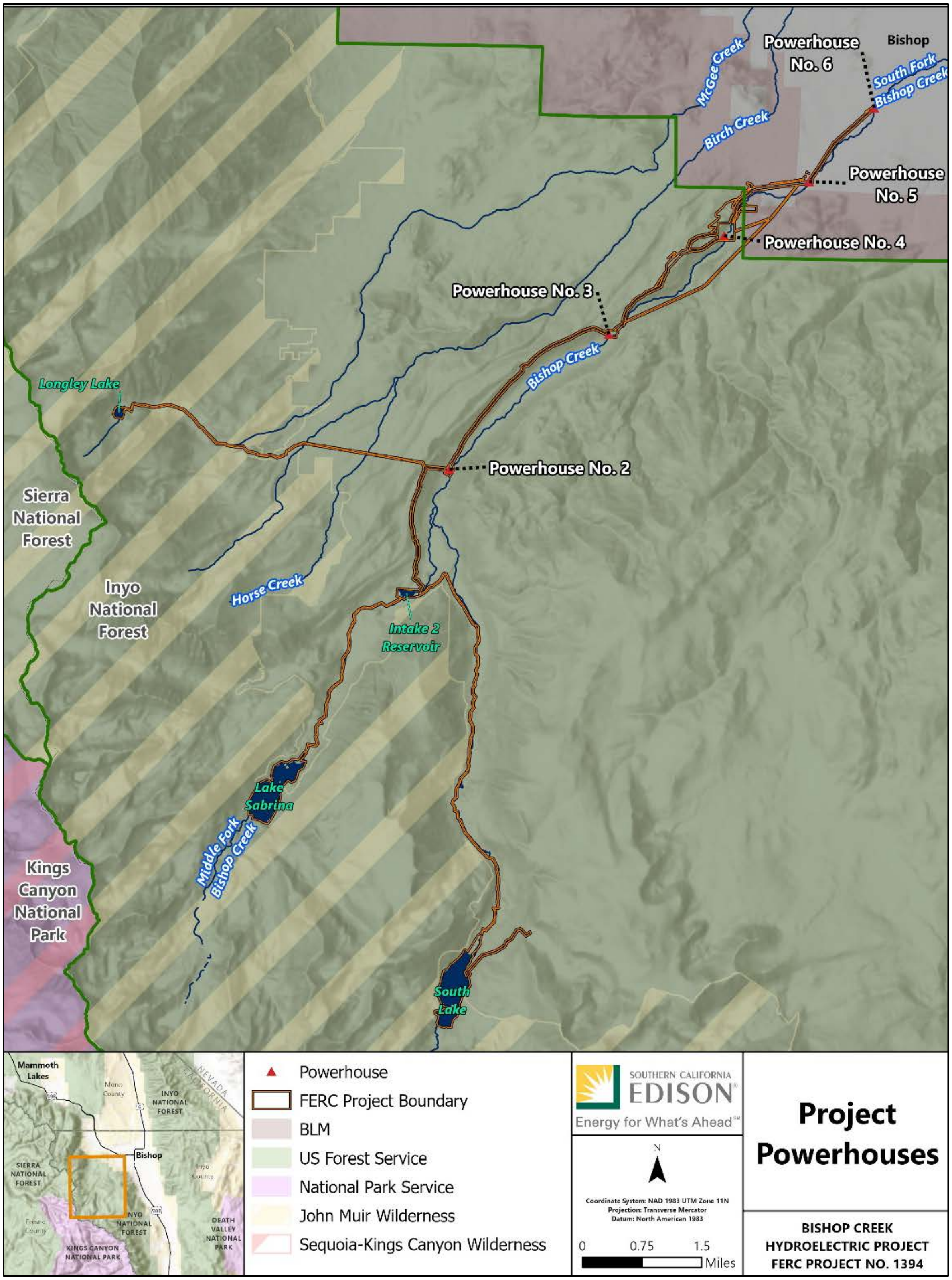

Figure 5.2-1. Bishop Creek Project Plants.

5.2.2 RESERVOIRS

The Bishop Creek Project includes three reservoirs: South Lake, Lake Sabrina, and Longley Lake. South Lake and Sabrina are the primary storage reservoirs for the Project, while Longley Lake is a secondary storage reservoir.

South Lake is operated as a store and release facility for water storage and downstream hydropower generation of electricity. South Lake holds and releases spring runoff to allow for regulated flows during the summer months to the plants and to provide for water recreation. South Lake has a net storage capacity of 12,883 acre-feet at normal full pool elevation 9,751.3 feet and a surface area of approximately 173 acres when full. The flow is regulated with an unlined tunnel with a capacity of 178 cubic feet per second (cfs). The submerged outlet tunnel intake portal is located approximately 1,200-feet-upstream of the dam.

Lake Sabrina has a net storage capacity of approximately 8,376 acre-feet at normal maximum reservoir level elevation 9,131.62 feet. The surface area of the reservoir when full is approximately 184 acres. Water is released to the downstream channel via low-level outlets; the intake is a fully submerged concrete box supporting three steel trash racks that is integral with the upstream side the dam. The invert of the intake is at elevation 9,067.42 feet.

Longley Lake is operated as secondary store and release facility for water storage and downstream hydropower generation of electricity. Longley Lake dam discharges water to McGee Creek, where it flows over 1 mile before being intercepted by the McGee Creek diversion. Water from Longley Lake, and the upper portions of the Birch Creek watershed, is received at Plant No. 2, before being conveyed through a series of pipes and penstocks connecting Plant No. 2, 3, 4, 5, and 6.

Table 5.2-2 provides additional information on Bishop Creek Project reservoirs.

Table 5.2-2. Water Surface Elevation and Gross Storage Capacity

	South Lake	**Lake Sabrina**	**Longley Lake**
Normal maximum surface area	173 acres	184 acres	11-acres
Normal maximum surface elevation	9,751.3 feet above sea level	9,131.62 feet above sea level	10,708 feet above sea level
Gross storage capacity	12,883 acre-feet	8,376 acre-feet	178 acre-feet
Usable storage capacity*	12,883 acre-feet	8,376 acre-feet	178 acre-feet

*The gross and usable storage capacity at South Lake, Longley, and Lake Sabrina are equal, due to the ability to completely empty each reservoir if needed.

5.2.3 Diversions and Dams

Green Creek diversion is located 0.8 miles east-northeast of the Hillside Dam (South Lake) spillway. A wooden head gate, 3-feet-long by 2-feet-high, is located approximately 80-feet-downstream from Bluff Lake on Green Creek. The head gate diverts water into an open channel approximately 1,400-feet in length to the Green Creek diversion intake. The diversion is earth and rockfill, located at elevation at 10,264 feet, approximately 51-feet along the crest and 9-feet-above the streambed. The diversion is equipped with a 12.5-foot-wide by 1-foot-deep spillway. The intake consists of a 16-inch-diameter steel pipe with a slide gate and a trash rack. A 16-inch-diameter drainpipe passes through the intake chamber which is constructed of concrete masonry. A 16-inch-diameter steel pipe, approximately 4,750-feet-long, extends into a natural channel, 1,150-feet in length, and carries water to South Lake.

South Fork diversion is earth and rockfill with a crest elevation at 8,211 feet, crest length of approximately 65 feet, and crest height of 10 feet above the streambed. The diversion is equipped with a 40-foot-wide by 6-foot-deep spillway. A 38-inch-diameter steel pipe with a gate valve and trash rack comprise the outlet. The spillway height may be raised or lowered with 4-inch by 6-inch flashboards, each 4-feet in length. A 12-inch-diameter drainpipe passes through the base of the intake chamber and a 36-inch-diameter drainpipe passes through the diversion. The flowline consists of approximately 4,104 feet of 38-inch-diameter steel pipe connected to 4,059 feet of 34-inch-diameter steel pipe. The flowline extends from the South Fork diversion to Intake No. 2 reservoir. The flowline is protected with air valves, expansion joints, a sand box, and a sand trap. The sand box is concrete lined, and approximately 17-feet by 24-feet with an exit to a 38-inch-diameter steel pipe extending to Intake No. 2. The sand box has two drain gates.

Hillside dam is an 81.5-foot-high rockfill timber face (covered with geomembrane) dam completed in 1910 to enlarge an existing natural lake (South Lake). The crest is 645-feet-long and is at elevation 9,757.6 feet. There is a 40-foot spillway, and a 1,900-foot unlined outlet tunnel that discharges into the South Fork of Bishop Creek, 600-feet downstream of the dam. The reservoir is operated as a regulating reservoir for a series of hydroelectric plants including Bishop Creek Plants No. 2 through No. 6.

Sabrina dam and associated facilities consist of a 70-foot by 900-foot timber face (covered with geomembrane) rockfill dam, an uncontrolled main spillway formed by an ogee crest, an uncontrolled auxiliary spillway formed by a concrete wall, and three low-level outlets. The dam forms Lake Sabrina, which is operated as a regulating reservoir for a series of hydroelectric plants which include Bishop Creek Plants No. 2 through No. 6.

Longley dam is an earth and rockfill dam constructed with a reinforced concrete core wall. The dam has a crest elevation of 10,708 feet, crest length of 120 feet, and crest height of 27 feet above streambed. The upstream face of the dam has a slope of 2 to 1 and a downstream face slope of 1.5 to 1. There are two 8-inch-diameter steel outlet pipes encased in concrete which pass through the base of the dam. Flow is controlled by two 10-inch gate valves. The spillway is 8-feet-wide by 2-feet-deep. The spillway channel is excavated in 8-foot-wide solid rock where water is diverted into McGee Creek.

Intake No. 2 dam is a 41-foot-high, 443-feet-long, earthfill dam with a concrete core wall extending over approximately half its length. The concrete corewall is discontinued on the right side of the dam where the dam is less than 20-feet-high. There is a service spillway with an ogee crest and an auxiliary spillway with an ungated concrete ogee crest, two low level outlet conduits, and one intake structure. Water is conveyed to flowline/penstock No. 2 through a 48-inch-diameter steel pipe that passes under the dam near the left abutment. The steel pipe connects to a second hydraulically operated, 48-inch-diameter butterfly valve located in a small building at the downstream toe of the dam. The butterfly valve controls flow through a 48-inch to 60-inch-diameter expansion to the 60-inch-diameter flowline to Bishop Creek Plant No. 2. The valves are normally open but are operable remotely from the SCE's Bishop Control Center located next to Plant No. 4.

A 24-inch-diameter sand sluice pipe runs parallel to the 48-inch-diameter pipe and passes under the dam. A 20-inch fish-water release pipe branches off the 24-inch sluice line directly above the valve house. The fish-water release piping was reconfigured and a new acoustic velocity meter (AVM) to measure flow was installed in 2008 to monitor and record minimum flow releases.

- **Intake No. 3 dam** consists of a 20-feet by 225-feet concrete arch; 40-feet by 3.5-feet spillway; 60-inch by 6,421-foot-long steel pipe; 60-inch by 6,209-foot steel pipe; and a 54-feet to 48-inch by 4,673-feet penstock

- **Intake No. 4 dam** consists of a 28-feet by 323-feet concrete arch; 50-feet by 5-feet spillway; 60-feet steel intake pipe; 60-inch by 6,242-feet steel pipeline; 30-feet by 24-inch by 5,314-feet penstock; and a 30-inch by 5,665-feet penstock

- **Intake No. 5 dam** consists of 20-feet by 275-feet concrete; 60-inch by 3-feet spillway; 60-feet steel pipe; 60-inch by 2,933-feet steel pipe; 60-inch by 540-feet concrete pipe; and two 42-inch by 4,800-feet penstocks

- **Intake No. 6 dam** consists of a 26-inch by 320-feet concrete dam; 6-feet spillway; 3,000-feet steel pipe; and a 54-inch by 4,360-feet penstock

- **Diversion pipe**: The Birch-McGee diversion pipe connects to the lower end of flowline No. 2. This 24-inch-diameter steel pipe conveys water from Birch and McGee creeks to flowline No. 2. The rated capacity of the Birch-McGee diversion pipe is approximately 40 cfs. The flowline collects water from the following:

    - **Birch-McGee diversion** is a 6-feet by 22-feet stone and concrete diversion dam; a 22-inch steel pipe connects to penstock No. 2 above Plant No. 2.

    - **McGee Creek diversion** is a 6-feet by 22-feet concrete dam on McGee Creek, with a 12-feet by 1-feet spillway. Water is diverted into an 18-inch steel outlet pipe and into a flowline, which discharges into Birch Creek above the Birch Creek diversion.

Summary information regarding the Bishop Creek Project's dams and diversions are provided in Table and the location is provided in Figure 5.2-1Figure 5.2-2.

Table 5.2-3. Project Facilities Specifications

Facility	Specification
Intake No. 2 Dam	
Dam	
Type	Concrete and earth fill
Crest elevation	8,103.50 feet
Crest length	443 feet
Height of Dam above Streambed	43 feet
Spillway	
Type	Ungated, concrete gravity block with ogee crest and flip bucket
Spill crest	40-feet-wide and 6-feet below the dam crest
Spillway sill elevation	8,098.8 feet
Auxiliary Spillway	
Type	Ungated, concrete ogee crest
Length	200-feet
Spillway sill elevation	8,100.8 feet
Outlets	
Low-level conduits	(2) 3-foot-wide by 3-foot-high
Intake	
Type	Reinforced concrete equipped with automatic trash rake and hydraulically operated 48-inch-diameter butterfly valve
Dimensions	4-foot-wide by 6-foot-high
Flowline/Penstock No. 2	
Type	Steel pipe
Dimensions	48-inch-diameter
Control	48-inch-diameter butterfly valve via 48-inch to 60-inch-diameter expansion
Type	Steel pipe with vacuum activated air valves at 1,000-foot intervals
Dimensions	60-inch-diameter by 9,765 feet
Fish Water Releaser	
Type	Sandbox
Dimensions	20-inch
Penstock	
Type	Partially buried steel with vacuum activated air valves at 1,000-foot intervals.
Dimensions	54-inch-diameter by 2,628-feet-long
Rated Capacity	140 cfs

Facility	Specification
Intake No. 3 Dam	
Dam	
Type	Concrete arch
Crest elevation	7,139 feet
Crest length	225 feet
Height of dam above streambed	20 feet
Spillway	
Type	Concrete and compacted rock
Spillway elevation	7,139.0
Dimensions	40-feet-wide by 3.5-feet-deep by 30-feet long
Outlet works	(2) 36-inch-diameter drain pipes controlled y 36-inch slide gates
Intake	
Type	Steel pipe with steel trash rack and grid rake
Dimensions	60-inch-diameter
Control	(2) 4-feet by 8-feet hydraulic lift gates
Outlet works	(3) 24-inch-diameter drainage pipes through base of intake chamber
Flowlines	
Type	Riveted steel pipe and welded steel pipe with air valves, stand pipes, and expansion joints.
Dimensions	60-inch-diameter by 6,421-feet long and 60-inch-diameter by 6,209-feet long.
Rated capacity	180 cubic feet-per-second
Penstock	
Type	Lap joint steel pipe and double riveted lap joint steel pipe; triple riveted butt joint steel pipe; with air valves, stand pipes, and expansion joints.
Dimensions	54-inch-diameter by 3,335-feet-long; 50-inch-diameter by 383-feet-long; 49-inch-diameter by 955-feet-long
Intake No. 4 Dam	
Dam	
Type	Concrete arch
Crest elevation	6,320 feet
Crest length	323 feet
Height of Dam above Streambed	28 feet
Spillway	
Type	Concrete ogee
Dimensions	50-feet-wide by 5-feet-deep by 39 feet long
Flowline	
Type	Steel pipe with stand pipes and air valves.

Facility	Specification
Dimensions	60-inch-diameter by
Control	30-inch valves
Rated capacity	133 cubic feet-per-second
Penstocks	
Type	Steel, equipped with air valves and expansion joints
Dimensions	30-inch-diameter to 24-inch-diameter by 5,314-feet-long
Type	Steel, equipped with air valves and expansion joints
Dimensions	30-inch-diameter by 5,665-feet-long
Intake No. 5 Dam	
Dam	
Type	concrete
Crest elevation	5,193 feet
Crest length	220 feet
Height of dam above streambed	20 feet
Spillway	
Type	Concrete Ogee
Feet below crest of dam	3 feet
Dimensions	60-feet-wide by 12-feet deep by 24-feet-Long
Intake	
Type	Concrete chamber connected to steel and reinforced concrete pipes
Dimensions	60-inch
Flowlines	
Type	Steel pipe
Dimensions	2,933-feet-long
Rated capacity	158 cubic feet-per-second
Penstocks	
Type	Steel, equipped with air valves and expansion joints
Dimension	42-inch-diameter by 4,800-feet-long
Control	(2) 42-inch gate valves
Intake No. 6 Dam	
Dam	
Type	Concrete
Crest elevation	4,775 feet
Crest length	320-feet
Height of dam above streambed	26-feet
Intake	
Type	Concrete chamber with steel outlet pipe and steel trash grid
Dimensions	19-feet by 21-feet chamber with 60-inch outlet pipe

Facility	Specification
Outlet works	(2) 24-inch-diameter drain pipes with gate valves
Spillway	
Type	Concrete ogee
Spillway elevation	4,772 feet
Dimensions	60-feet by 14-feet deep by 26-feet long
Outlet works	(1) 46-inch-diameter and (1) 36-inch-diameter drain pipe
Control	(1) 46-inch slide gate and (1) 36-inch slide gate
Flowline	
Type	Steel
Dimensions	60-inch-diameter by 3,000 feet-long
Rated capacity	133 cfs
Penstock	
Type	Steel pipe equipped with air valves and expansion joints
Dimensions	54-inch-diameter by 4,360-feet-long
Green Creek Diversion	
Diversion Dam	
Type	Earth and rockfill
Crest elevation	10,264 feet
Crest length	51 feet
Height of dam above streambed	9 feet
Control	3-feet-long by 2-feet-high wooden head gate
Outlet Works	
Type	Open channel
Dimensions	1,400 feet
Control	Wooden-head gate, 3-feet-long by 2-feet-high
Spillway	
Type	Concrete masonry
Dimension	12.5-feet-wide by 1-foot-deep by 12.5-feet-deep
Intake	
Type	Steel pipe with slide gate and trash rack, concrete chamber
Dimensions	16-inch-diameter
Outlet works	16-inch-diameter by 4,750-feet-long drain pipe
Control	1150-feet-long natural channel
South Fork Diversion	
Dam	
Type	Earth and rockfill
Crest elevation	8,211 feet
Crest length	65 feet

Facility	Specification
Height of dam above streambed	10 feet
Outlet works	36-inch-diameter drain-pipe
Spillway	
Type	Rock and concrete, equipped with 4-inch by 6-inch flashboards, each 4-feet-long
Dimensions	40-feet-wide by 6-feet-deep
Outlet works	38-inch-diameter steel pipe with gate valve and trash rack
Intake	
Type	Concrete chamber with steel pipe with slide gate and trash rack
Dimensions	12-feet long by 7-feet wide
Flowline	
Type	Steel pipe protected with air valves, expansion joints, a sand box, and a sand trap
Dimensions	38-inch-diameter by 4,101-feet-long and 34-inch-diameter by 4,059-feet-long
Control	Concrete lined 17-feet by 24-feet sandbox with exit to 38-inch-diameter steel pipe and two drain gates
Hillside Dam	
Dam	
Type	Rockfill
Crest elevation	9,756.6 feet
Crest length	645 feet
Height of dam above streambed	810 feet
Spillway	
Type	Ungated bedrock with concrete lip
Spillway elevation	9,751.3 feet
Feet below top of dam	6.3 feet
Dimensions	40-feet-long
Outlet works	Lateral from reservoir into bedrock granite ravine and boulder-lined channel
Discharge capacity	1,700 cfs
Intake	
Type	Submerged
Dimensions	1,200 feet upstream of dam
Outlet Works	
Type	Unlined outlet tunnel in hard granite bedrock, 36-inch-diameter steel pipe with trash rack
Dimensions	1,900-feet-long and 5-feet by 7-feet in cross section
Type	Slide gate, assumed inoperable due to submersion by reservoir and lack of visual inspection since 1952

Facility	Specification
Dimensions	3-feet by 5-feet slide gate
Type	Slide gate, concrete bulkhead
Dimensions	30-inch-diameter pipe
Control	24-inch-diameter steel pipe connected to operations chamber with rated capacity of 178 cfs
Sabrina Dam	
Dam	
Type	Timber-faced rockfill
Crest elevation	9,137.9 feet
Crest length	900 feet
Height of dam above streambed	70 feet
Spillways	
Type	Ungated, concrete gravity with ogre crest and a flat flip bucket
Dimensions	40-feet-wide
Spillway crest elevation	9,131.62 feet
Auxiliary Spillway	
Type	Ungated concrete
Dimensions	76-feet-long
Spillway crest elevation	9,134.37 feet
Combined rated maximum discharge of both spillways	3,7000 cfs
Intake	
Type	Fully submerged concrete box supporting three steel trash racks
Outlet Works	
Type	Steel pipes encased in concrete
Dimensions	(3) 24-inch-diameter
Control	24-inch gate valve
Longley Dam	
Dam	
Type	Earth and rockfill
Crest elevation	10,708.1 feet
Crest length	120 feet
Height of dam above streambed	27 feet
Outlet Works	
Type	(2) Steel pipes encased in concrete
Dimensions	8-inch-diameter
Control	(2) 10-inch gate valves
Spillway	
Type	Solid bedrock

Facility	Specification
Dimensions	8-feet-wide by 2-feet-wide
Birch Creek Diversion	
Dam	
Type	Stone and concrete
Crest elevation	8,303.61 feet
Crest length	22 feet
Height of dam above streambed	6 feet
Spillway	
Type	Headgate with 2-inch-by-12-inch flash boards 3-feet-long
Dimensions	3-feet-wide
Intake	
Type	Concrete equipped with steel trash grid
Outlets	24-inch-diameter steel outlet pipe; 12-inch drain pipe
Flowline	
Type	Slip joint welded steel pipe
Dimensions	24-inch-diameter by 9,513-feet-long
Birch-McGee Diversion Pipe	
Diversion	
Type	Steel pipe
Dimensions	24-inch-diameter
Rated capacity	40 cfs
McGee Creek Diversion	
Dam	
Type	Stone and concrete
Crest elevation	9,192 feet
Crest length	22 feet
Height of dam above streambed	6 feet
Spillway	
Type	Concrete channel
Dimension	12-feet-wide by 1-feet-deep
Outlet Works	
Type	Slide gate
Dimension	18-inch-diameter
Type	Drain pipe
Dimension	12-inch-diameter
Flowline	
Type	Welded steel pipe, open ditch
Dimensions	2,774-feet-long

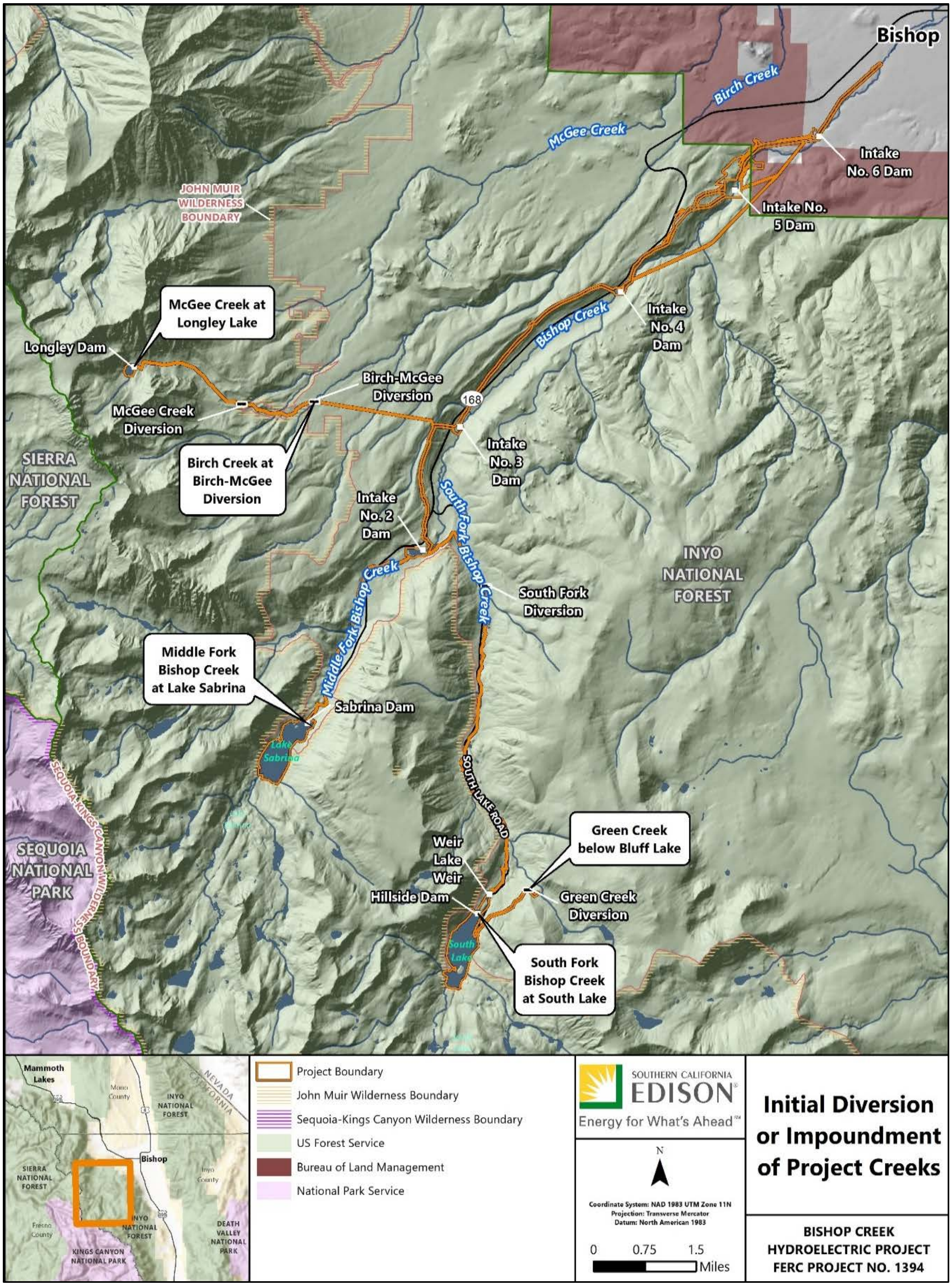

Figure 5.2-2. Initial Diversions or Impoundment of Project Creeks.

5.2.4 FLOWLINES

The Bishop Creek Project utilizes flowlines that collect water from Green Creek (a tributary to Bishop Creek), Birch Creek, and McGee Creek.

5.2.5 INTAKES/PENSTOCKS

SCE uses intake and diversion structures (penstocks) to divert water from a stream, canal or intermittent man-made waterway into a canal or intermittent man-made waterway. Stream deposits are removed above and or below intake structures. Exhibit A for a more detailed account of the Bishop Creek Project's intake structures and penstocks.

5.2.6 TRANSMISSION, POWER, AND COMMUNICATION LINES

The Project includes the following transmission lines:

- A 3.7-mile-long, 115-kilovolt (kV) transmission line from Plant No. 3 to the control substation; (control-Plant No. 3-Plant No. 4)[3]
- A 0.7-mile-long, 115-kV transmission line which runs from the Plant No. 4 switchyard to the transmission line connecting Plant No. 3 to the control substation (control-Plant No. 3-Plant No. 4)[4].
- A 150-foot-long, 55-kV transmission line which runs from the Plant No. 5 to tap the transmission line between Plant No. 6 switchyard and the control substation (Control-Mt. Tom).[5]

5.2.7 GAGES

SCE in cooperation with the United States Geological Survey (USGS) maintain a network of 17 streamflow gages on Bishop Creek and its tributaries (Table 5.2-4). The earliest gages began providing data in 1985; additional gages were installed between 1986 and 1995. Two gages, Coyote Creek (USGS No. 10270960) and Birch Creek below diversion dam (USGS No. 10268282) were only operational for a short time; between 1990 and 1996, and 1995 and 1999, respectively.

In addition to streamflow gages, SCE operates three precipitation gages, and six snow survey sites. Details about SCE's water monitoring program, including its streamflow and precipitation network (Table 5.2-4), are provided in Section 8.4 – Water Resources of this document.

[3] Transmission line begins at control substation and ends at Plant No. 3.

[4] Transmission line begins at control substation and ends at Plant No. 4.

[5] Transmission line begins at control substation and ends at Plant No 6 with a tap that breaks off to Plant No. 5.

Table 5.2-4. Streamflow Gaging Stations Associated with the Bishop Creek Project

Stream Gages	USGS Gage No.	SCE No.
South Fork Bishop Creek below South Lake	10270800	310
Middle Fork Bishop Creek below Lake Sabrina	10270872	307
Middle Fork Bishop Creek below Intake No. 2	10270877	308
McGee Creek below diversion dam (Fish released at diversion)	10268227	321
McGee Creek diversion	10268225	
Birch Creek below diversion dam (Fish release at Birch/McGee intake)[1]	10268282	320
South Fork Bishop Creek below South Fork diversion	10270830	322
Bishop Creek below Intake No. 3 diversion	10270885	323
Bishop Creek below Intake No. 4 diversion	10270940	324
Bishop Creek below Intake No. 5 diversion	10270970	325
Bishop Creek below Plant No. 6[1]	10271210	
Bishop Creek above Plant No. 6[2]	10271200	302
Bishop Creek Plant No. 6 conduit[2]	10271060	313
South Lake reservoir	10270700	312
Intake No. 2 (reservoir)	10270877	303
Abelour ditch below Bishop Creek Plant No. 5	10270985	301
Green Creek conduit outlet near Bishop	10270680	
Coyote Creek near Bishop, CA[1]	10270680	
Birch-McGee Creek diversion to Bishop Creek Plant	10270900	

[1] Historical gage
[2] Compliance with Chandler Decree is measured as a combination of these two gages

5.2.8 ACCESS ROADS AND TRAILS

Project access roads and trails are described in Table 5.2-5.

Table 5.2-5. Project Access Roads and Trails

Project Access Roads	Length (Miles)	Owner[1]
Unnamed (Along Flowline 6)	0.11	SCE
Unnamed (Access to gage below Plant 5)	0.03	SCE
Unnamed (Access to Plant 5)	0.03	SCE
Unnamed (Access to east side of Intake No. 6 Dam)	0.04	SCE
Plant 5 Road (East)	0.10	SCE
Plant 5 Road (West)	0.38	BLM
Unnamed (Access to Plant 5 Penstocks)	0.36	BLM
Unnamed (Access to Plant 5 Penstocks)	0.07	BLM
Unnamed (Access to Plant 5 Penstocks)	0.12	BLM
Unnamed (Access to Flowline 5)	0.27	SCE
Unnamed (Access to Flowline 5)	0.05	SCE
Unnamed (Access to Flowline 5)	0.15	SCE
Unnamed (Access along Flowline 5)	0.07	BLM
Unnamed (Access along Flowline 5)	0.49	SCE
Unnamed (Access to Gravel Pit/Staging Area)	0.13	BLM
Unnamed (Access to Gravel Pit/Staging Area)	0.10	SCE
Unnamed (Access to Staging Area from E. Bishop Cr. Rd.)	0.03	SCE
Unnamed (Access to Staging Area below Intake No. 5 Dam)	0.17	SCE
Unnamed (Flowline 5 to Plant 4 Penstocks)	0.15	SCE
USFS 07S110 (Flowline 5 to Plant 4 Penstocks)	0.76	USFS
USFS 07S110D (Access to Cell Phone Repeater)	0.26	USFS
USFS 07S110 (Along Plant 4 Penstock 2)	0.75	USFS
USFS 07S110A (Spoils area between CA Hwy 168 and Plant 4 Penstocks)	0.09	USFS
USFS 08S10T (Spoils area between CA Hwy 168 and Plant 4 Penstocks)	0.28	USFS

Project Access Roads	**Length (Miles)**	**Owner[1]**
USFS 07S110 (Along Flowline 4)	1.20	USFS
USFS 07S110 (Along Flowline 4)	0.18	SCE
Unnamed (Along Flowline 4)	0.36	USFS
Unnamed (Access to Intake No. 4 Dam)	0.05	SCE
Unnamed (Access to weir below Intake No. 4 Dam)	0.06	SCE
Unnamed (Access to south side of Intake No. 4 Dam)	0.11	SCE
Unnamed (West Bishop Cr. Rd. to west side of Plant 3)	0.20	USFS
USFS 07S15B (Along Flowline 3)	1.77	USFS
Unnamed (Along Flowline 3)	0.09	LADWP
USFS 07S15B (Along Flowline 3)	0.21	USFS
Unnamed (Big Trees Road to Flowline 3)	0.08	USFS
Unnamed (Access along Flowline 3)	0.33	USFS
Unnamed (Big Trees Road to north side of Plant 2)	0.06	USFS
Unnamed (Big Trees Road to south side of Plant 2)	0.13	USFS
Buttermilk Road/USFS 07S01 (Access to Birch Creek Diversion Flowline)	0.27	USFS
USFS 07S01V (Access to gage at end of Birch Creek Diversion Flowline)	0.22	USFS
Unnamed (Buttermilk Rd to Flowline 2)	0.11	USFS
USFS 08S103 (Along Flowline 2)	1.58	USFS
Unnamed (Along Flowline 2)	0.24	SCE
Unnamed (Flowline 2 to Intake No. 2)	0.17	SCE
USFS 08S10B-1 (Access to south side of Intake No. 2 Dam)	0.36	USFS
Unnamed (Access to Birch-McGee Diversion)	0.12	LADWP
Unnamed (Access to McGee Creek Diversion)	0.12	USFS
Unnamed (Access to South Fork Diversion)	0.21	SCE
Project Trails		
Sabrina Basin Trail (from trailhead to base of spillway)	0.12	USFS
Access trail to McGee Creek Diversion	0.15	USFS

[1]Land ownership to be verified for FLA

5.2.9 Ancillary and Support Facilities

Additional ancillary and support facilities, along with all other associated Project features are described in Table 5.2-6.

Table 5.2-6. Mechanical, Transmission, and Electrical Equipment Appurtenant to the Project

Appurtenant Facilities	Location(s)
Cell Phone Repeater	Approximately 900 feet north and uphill of Plant 4.
Deer Guzzlers and Animal Crossings	Along Flowline 2, there are two deer guzzlers and two animal crossings in place.
Air Valves	Air valves are found periodically along the following flowlines or penstocks: • South Fork Diversion Flowline • Flowline 2 • Powerhouse 2 Penstock • Flowline 3 • Powerhouse 3 Penstock • Flowline 4 • Powerhouse 4 Penstocks • Flowline 5 • Powerhouse 5 Penstocks • Powerhouse 6 Penstock
Standpipes	Standpipes are found periodically along the following flowlines or penstocks: • Flowline 2 • Powerhouse 2 Penstock • Flowline 3 • Powerhouse 3 Penstock • Flowline 4 • Flowline 6
Gate Valve By-passes	• Flowline 3 • Powerhouse 4 Penstock 1 • Powerhouse 4 Penstock 2
Weather Station	Approximately 400 feet downstream of the Low-Level Outlet for Sabrina Dam.

5.3 FERC Project Boundary

Since the July 16, 1994 issuance of a new license for the Bishop Creek Project, several changes have occurred through a series of amendment applications and FERC Orders that began in 1998. Figure 3.1-1 shows the current FERC boundary; Table 5.3-1 summarizes notable the Bishop Creek Project boundary changes during that period.

Table 5.3-1. Notable Project Boundary Changes During Current FERC License

Project Boundary Change	Order Approving
Removal of a 1.3-mile-long, 55-kV transmission line which runs from Plant No. 6 switchyard to the control substation	Conditionally approved by FERC Order of February 28, 2002. This Order provided final approval and an effective date for deletion of the transmission lines as of December 5, 2001 and March 12, 2007, which are the dates that SCE received authorization for continued use of the federal lands from the BLM and the USFS, respectively.
Removal of a 6.9-mile-long, 55-kV transmission line which runs from the switchyard at Plant No. 2 to the control substation	Conditionally approved by FERC Order of February 28, 2002. This Order provided final approval and an effective date for deletion of the transmission lines as of December 5, 2001 and March 12, 2006, which are the dates that SCE received authorization for continued use of the federal lands from the BLM and the USFS, respectively.
Removal of 1.07 acres of lands associated with Horse Creek diversion, which was removed to allow free flow in Horse Creek in compliance with Article 105.	Approved by FERC Order of February 28, 2002.
Removal of 33.18 acres of lands surrounding demolished company housing.	Approved by FERC Order of February 28, 2002.
Addition of 1.17 acres for gauging stations and access roads.	Approved by FERC Order of February 28, 2002.

On April 2, 2010, FERC issued an Order to approve SCE's revised Exhibit G drawings and associated federal acreage for the Bishop Creek Project. By letter dated May 5, 2010, SCE submitted geographic information system (GIS) Project boundary data, as required by paragraph (c) of that Order.Table Table 5.3-2 summarizes land ownership within the Bishop Creek Project boundary based on this approved data. Potential changes to the Project boundary are described in Section 6.1 - FERC Project Boundary Modifications.

Table 5.3-2. Land Ownership within Project Boundary

Ownership	Acreage	Percentage of Total
U.S. Forest Service	733.8	67.8
Bureau of Land Management	47.6	4.4
Non-federal	300.9	27.8
Total Project Acreage	***1082.3***	

5.4 PROJECT MAINTENANCE

Routine inspections and maintenance activities are conducted at Bishop Creek Project facilities to verify the structural and/or functional integrity of the facilities, to identify conditions that might disrupt operation or threaten public safety, and to maintain the facilities in safe and operational conditions. These activities are further defined in the following text. Table 5.4-1 and Table 5.4-2 provide an overview of the routine O&M activities, including:

- Road maintenance
- Trail maintenance
- Transmission, power and communication line maintenance
- Maintenance outages
- Plant inspections and maintenance
- Flowline inspections and maintenance

Many of these maintenance activities are subject to state of California Department of Fish and Game Notification of Lake or Streambed Alteration, pursuant to Section 1600 (et. seq) of the Fish and Game Code. SCE entered into a long-term agreement (LTA) with the California Department of Fish and Game (CDFW) to streamline the permitting process. Provisions of the LTA are incorporated by reference and provides for routine activities as described in the following Sections 5.4.1 - Material Removal through 5.4.4 - Sediment Management.

Table 5.4-1. Description of Current Maintenance Activities at Project Facility Structures

Facility	Maintenance Outages	Plants		Flowlines		Transmission, Power, and Communication Line Maintenance
		Inspections	Maintenance	Inspections	Maintenance	
Dams & Diversions						
Green Creek Diversion	A			A	AN	
Birch McGee Intake	A		A			
Birch McGee flowlines and sand traps			M			
Birch McGee flowlines and sand traps			M			
South Fork Diversion sluice gate	A			A	AN	
South Fork Diversion flowline and sand traps			M			
South Fork Diversion flowline and sand traps			M			
Hillside Dam	A			A	AN	
Weir Lake Weir	A			A	AN	
Sabrina Dam	A			A	AN	
Longley Dam	A			A	AN	
Intake No. 2 Dam	A			A	AN	
Intake No. 2 chamber drain and low level outlet (LLO)			M			
Intake No. 2 chamber drain and low level outlet (LLO)			M			
Intake No. 3 Dam	A			A	AN	
Intake No. 3 chamber drain and LLO			M			

Facility	Maintenance Outages	Plants		Flowlines		Transmission, Power, and Communication Line Maintenance
		Inspections	Maintenance	Inspections	Maintenance	
Intake No. 3 chamber drain and LLO			M			
Intake No. 4 Dam	A			A	AN	
Intake No. 4 chamber drain and LLO			M			
Intake No. 4 chamber drain and LLO			M			
Intake No. 5 Dam	A			A	AN	
Intake No. 5 chamber drain and LLO			M			
Intake No. 5 chamber drain and LLO			M			
Intake No. 6 Dam	A			A	AN	
Plants						
Plant No. 2	A	W	AN			
Plant No. 3	A	W	AN			
Plant No. 4	A	W	AN			
Plant No. 5	A	W	AN			
Plant No. 6	A	W	AN			
Plant No. 6 flowline and sand trap			M			
Plant No. 6 flowline and sand trap			M			
Transmission Lines						

Facility	Maintenance Outages	Plants		Flowlines		Transmission, Power, and Communication Line Maintenance
		Inspections	Maintenance	Inspections	Maintenance	
Plant No. 3 to the control substation (control-Plant No. 3-Plant No. 4)[6]						A/AN
Plant No. 4 to Plant No. 3 to control substation (control-Plant No. 3-Plant No. 4)[7]						A/AN
Plant No. 5 to Plant No. 6 switchyard and control substation (control – Mt. Tom)[8]						A/AN

A = Activity occurs on an annual basis
AN = Activity occurs on an as-needed basis
D = Activity occurs on a daily basis
I = Activity occurs on an infrequent basis
M = Activity occurs on a monthly basis
W = Activity occurs on a weekly basis

[6] Transmission line begins at control substation and ends at Plant No. 3.

[7] Transmission line begins at control substation and ends at Plant No. 4.

[8] Transmission line begins at control substation and ends at plant No. 6 with a tap that breaks off to Plant No. 5.

Table 5.4-2. Description of Current Maintenance Activities at Project Facility Vegetation, Roads, and Trails

Facility	Vegetation Management		Hazard Tree Removal	Pest Management	Sediment Management	Road Maintenance	Trail Maintenance
	Trimming by Hand	Herbicide Use					
Dams & Diversions							
Green Creek Diversion	AN	I	AN	AN	AN	AN	AN
South Fork Diversion	AN	I	AN	AN	AN	AN	AN
Hillside Dam	AN	I	AN	AN	AN	AN	AN
Weir Lake Weir	AN	I	AN	AN	AN	AN	AN
Sabrina Dam	AN	I	AN	AN	AN	AN	AN
Longley Dam	AN	I	AN	AN	AN	AN	AN
Intake No. 2 Dam	AN	I	AN	AN	AN	AN	AN
Intake No. 3 Dam	AN	I	AN	AN	AN	AN	AN
Intake No. 4 Dam	AN	I	AN	AN	AN	AN	AN
Intake No. 5 Dam	AN	I	AN	AN	AN	AN	AN
Intake No. 6 Dam	AN	I	AN	AN	AN	AN	AN
Plants							
Plant No. 2	AN	I	AN	AN	AN	AN	AN
Plant No. 3	AN	I	AN	AN	AN	AN	AN
Plant No. 4	AN	I	AN	AN	AN	AN	AN
Plant No. 5	AN	I	AN	AN	AN	AN	AN
Plant No. 6	AN	I	AN	AN	AN	AN	AN
Transmission Lines							

Facility	Vegetation Management		Hazard Tree Removal	Pest Management	Sediment Management	Road Maintenance	Trail Maintenance
	Trimming by Hand	Herbicide Use					
Plant No. 3 to the control substation (control-Plant No. 3-Plant No. 4)[9]	AN	I	AN	AN	AN	AN	AN
Plant No. 4 to Plant No. 3 to control substation (control-Plant No.3-Plant No.4)[10]	AN	I	AN	AN	AN	AN	AN
Plant No. 5 to Plant No. 6 switchyard and control substation (control – Mt. Tom)[11]	AN	I	AN	AN	AN	AN	AN

A = Activity occurs on an annual basis
AN = Activity occurs on an as-needed basis
D = Activity occurs on a daily basis
I = Activity occurs on an infrequent basis
M = Activity occurs on a monthly basis
W = Activity occurs on a weekly basis

[9] Transmission line starts at control substation and ends at Plant No. 3.

[10] Transmission line starts at control substation and ends at Plant No. 4.

[11] Transmission line starts at control substation and ends at Plant No. 6 with a tap that breaks off to Plant No. 5.

5.4.1 Material Removal

When required, SCE removes material that obstructs the water diversions and operations of hydroelectric generation.

5.4.2 Vegetation Management

SCE controls vegetation growth at or adjacent to its facilities to prevent overgrowth of vegetation that interferes with the flow of water and the measurement of flow through the gaging stations. Methods proposed for vegetation control include selective thinning, selective removal, or mowing.

The Vegetation Management Department or its authorized contractor will field check, document, determine trim/removal requirements, and complete all orders assigned. This will include advising the customer of actions to be taken to resolve tree trim requests. The SCE representative will deliver all work order requests to the contractor. The SCE representative will record in the Call Workflow Optimization (CWO) system all pertinent information supplied by the contractor, including the date the work was completed.

5.4.2.1 Wildfire Vegetation Management

SCE conducts additional vegetation inspections and maintenance in High Fire District Threats (HFDT) as part of the Wildfire Mitigation Plan (WMP). Sites located in the HFTD get inspected on an annual basis and many sites have an expanded clearances; expanded clearances in HFDT for High Voltage facilities have a 100 foot clearance and Low Voltage sites have a 30 foot clearance in order to reduce wildfire ignition risks. In order to maintain the expanded clearances vegetation maintenance will be done annually on a regular scheduled rotation.

5.4.2.2 Trimming by Hand

Vegetation trimming and removal/clearing is performed every other year along all Bishop Creek Project roads and at facilities, including plants, dams and small diversions, water conveyance systems, penstocks, and stream gages. SCE staff brush mow along roadways to maintain roads as necessary for safe line of sight and passage. Trimming is performed both manually and with tools/equipment (i.e., weed whacker or chainsaw).

5.4.2.3 Herbicide Use

Herbicide spraying is performed annually at Bishop Creek Project facilities, including sandboxes, forebays, pressure tunnels, penstocks, and plants. SCE staff spray pre-emergent vegetation, followed by post-emergent vegetation as necessary. When needed, SCE staff weed whack within flat areas prior to spraying. Herbicide spraying is conducted in accordance with Forest Service 4(e) Condition 25.

5.4.2.4 Hazard Tree Removal

Hazard tree inspection and removal are performed as needed along all Bishop Creek Project roads and at facilities, including plants, dams and small diversions, water conveyance systems, penstocks, and stream gages. SCE staff remove hazard brush and trees that are deemed a threat to road or vehicles traveling them, or near Project infrastructure. Removal will be as needed and will be performed both manually and with tools/equipment.

5.4.2.5 Pest Management

Along with vegetation management as described above and as conditioned by the INF Service 4(e) Condition 25, SCE utilizes pest management techniques at Bishop Creek Project facilities. Maintenance activities, including pest management, are described in Table .

5.4.3 Facilities Repair

SCE routinely makes repairs to structures and facilities and conducts maintenance to retain the functional and structural integrity of the Bishop Creek Project facilities. Facilities include measuring stations and flumes, intakes and diversion structures, and flow meters. Within these facilities, maintenance and repairs may occur on gates, barricades, small structures (e.g., gauging stations and storage facilities), streambanks and diversions. Major categories of facilities described in the LTA include:

Measuring Stations and Flumes: SCE uses measuring stations and flumes to measure water in the waterways. Maintenance work related to measuring stations and flumes include mowing of vegetation to provide access along channel banks and the removal of stream deposit within an area of measuring stations to allow for unobstructed water flow, and the accurate reading of water flow in waterways.

Intake and Diversion Structures: SCE uses intake and diversion structures to divert water from a stream, canal or intermittent man-made waterway into a canal or intermittent man-made waterway. Stream deposits are removed above and or below intake structures.

Gate Inspection and Maintenance: are mandated by the Department of Safety of Dams. This may include the operation of intake drain gates, sand traps and chamber drain gates and will not result in the draining of any ponds. These routine operations do not result in the draining of any ponds, which minimize impacts to the stream. SCE is required to inspect penstocks, which does involve lowering the ponds to expose the entry point to the penstock.

5.4.4 Sediment Management

Because of the nature of the facilities, stream deposits accumulate behind diversions and other structures and these deposits require regular removal or control. Stream deposits are managed as follows:

Stream Deposit Bypass: Historical practice has been to remove one, several, or all plants as needed from service in late winter or early spring and reduce creek flows to levels that: (a) are great enough to maintain downstream users' requirements (Chandler Decree) and (b) are small enough to allow all flows to pass through the open drain valves of desired intakes. Normally intakes are left in this state for 24 to 48 hours. This cuts a channel through the stream deposit and gravel that accumulated in the intake and carries the deposits and gravel into the stream below the intake dams. SCE typically performs the necessary material removal in the springtime to augment the natural flows to assist in the removal of sediment and debris.

Stream Deposit Removal: SCE periodically removes sediments and debris not moved by bypass flows from intakes by draining the intakes and utilizing heavy equipment. Barring extreme climatic events, it is presumed this procedure will be undertaken on a limited basis. To manage sediment in the impoundments, SCE periodically removes sediment to maintain storage capacity and minimize the potential of sediment being sucked through the plants.

- Use of low-level outlet for reservoir drawdown and flushing flows
- Best management practices (BMP)
- Operation and exercise of the equipment (low-level outlets) enables maintenance on other components such as intakes and flowgates
- Periodic maintenance on the dams (Intake No. 2 example), weir ponds

Stream Entry: Several sites require stream entry for maintenance purposes. For all areas listed below, SCE restricts activity in the channel to an area no further upstream or downstream than necessary to do the work. For all areas described in the LTA, SCE restricts activity in the channel to an area within 50 feet upstream and 50 feet downstream of the work site. The work is performed between March 1 and May 30, to augment the natural flows to assist in the removal of sediment and debris. Rubber mats are used for crossing streams with mechanical equipment and sediment control structures shall be implemented to prevent streambed materials from flowing downstream. Areas where SCE may need to access the stream include:

- Bishop Creek Channel above Powerhouse No. 6 Tailrace
- Bishop Creek above and below Intake No. 5
- Bishop Creek above and below Intake No. 4
- Bishop Creek above and below Intake No. 3
- Below Intake No. 2
- Above South Fork Diversion

- Below South Fork Diversion
- Birch Creek below Birch/McGee Diversion
- Abelour Ditch
- Above and below the following measuring stations and flumes including:
    - South Fork weir
    - Plant 6 weir
    - Sabrina weir

5.5 PROJECT OPERATIONS

The Bishop Creek Project begins diverting or impounding water at five points: Green Creek at Bluff Lake, South Fork Bishop Creek at South Lake, Middle Fork Bishop Creek at Lake Sabrina, McGee Creek at Longley Lake, and Birch Creek at Birch-McGee Diversion (Figure 5.5-1).

Water from the Green Creek basin flows into Bluff Lake and is released into a ditch that carries the water to the Green Creek diversion (10,264-feet mean sea level [msl]). From this point, water flows through a pipeline to South Lake where it meets flows from the upper watershed of the South Fork of Bishop Creek. Water is also released from Hillside Dam (9,757.6-feet msl) into South Fork where it meets with the remaining flows from Green Creek that were not diverted. Together this water flows down the South Fork of Bishop Creek to the South Fork diversion (8,211-feet msl). At the South Fork diversion structure, a portion of the flow is diverted through a pipeline to Intake No. 2 (8,105-feet msl), as the remainder if the flow continues down South Fork. Upper watershed areas contributing to the Middle Fork of Bishop Creek drain into Lake Sabrina. Water is released through Lake Sabrina Dam (9,137.9-feet msl) into the Middle Fork of Bishop Creek. Water flows approximately 1 mile before converging with the unimpaired North Fork of Bishop Creek. The combined waters flow to Intake No. 2 dam (8,104.8-feet msl) which receives water from the South Fork Diversion flowline. From Intake No. 2 dam, the water enters a 2.1-mile-long flowline and a 0.5-mile-long penstock which connects to Plant No. 2 sited on Bishop Creek.

Plant No. 2 receives water originating from Longley Lake dam (McGee Lake) and the upper portions of the Birch Creek watershed. Longley Lake dam (10,708.0-feet msl) discharges water to McGee Creek where it flows over 1 mile before being intercepted by the McGee Creek Diversion (9,192.0-feet msl). Water is diverted into a series of pipelines and open channels and delivered to Birch Creek. After entering Birch Creek, the water flows approximately 0.5 mile before being diverted again by the Birch-McGee diversion (8,304.0-feet msl). At this point, the water enters a pipe where it descends over 1,100 feet in elevation before intercepting the penstock to Bishop Plant No. 2.

From this point on, a portion of the water flows down Bishop Creek, and a portion is conveyed through a series of pipes and penstocks connecting Plant No. 2, 3, 4, 5, and 6. Each plant and intake controls the portion of water entering Bishop Creek and the portion directed into the pipe and penstock conveyances. After Plant No. 6, Bishop Creek flows to the Bishop community and the Owens Valley. In addition, a 1.79-mile ditch (Abelour ditch) carries a water right from the Plant No.6 penstock to the Rocking K subdivision. When Plant No. 6 is offline, there is an alternate take-off below Plant No. 5.

Plant operation is dictated by water availability. Both the Chandler Decree and the Sales Agreement form the standard of operations for which all regulations must be prioritized. Section 5.6 - Project Generation and Outflow Records provides rule curves that describe the general allocation of water for these constraints during mean, high- and low-water years

The next operational consideration is the minimum flow requirements below the dams and intakes (Section 5.5.2.1 - Existing FERC License Articles). The remaining water is used for generation. Plant operators consider unit availability and capacity and determine the best configuration at each plant (SCE 2019).

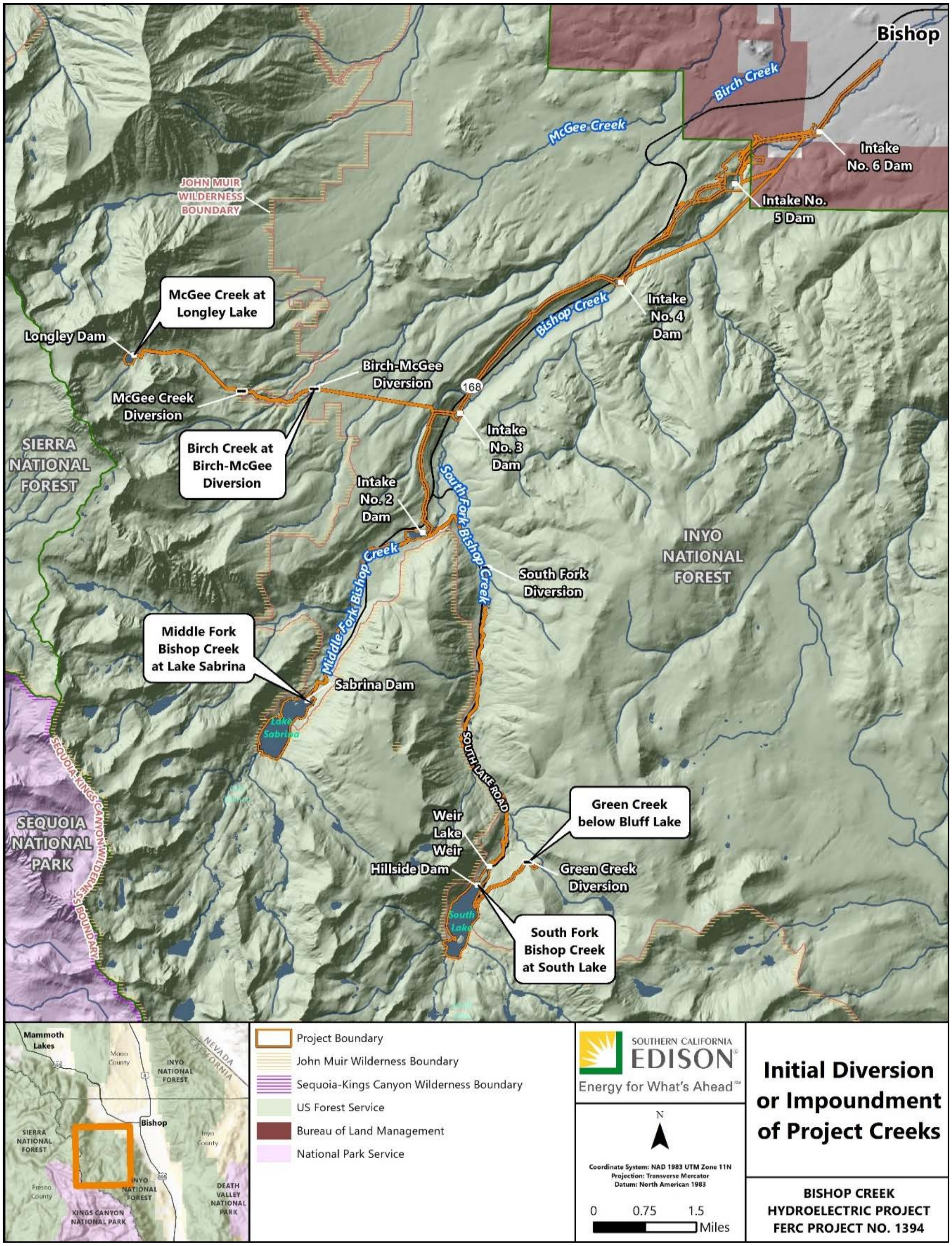

Figure 5.5-1. Diversions or Impoundment of Project Creeks.

5.5.1 Regulatory Requirements

5.5.1.1 Existing FERC License Articles

The licensed Bishop Creek Project is subject to Articles 1-28 of FERC's standard terms and conditions set forth in Form L-1, (October 1975) entitled T*erms and Conditions of License for Constructed Major Project Affecting Navigable Waters of the United States*. Project-specific license Articles are stated in the 1994 License Order as amended. Table 5.5-1 summarizes requirements of primary resource-related license articles.

The Bishop Creek Project is not currently subject to a SWRCB WQC. SCE applied for a WQC on March 28, 1986. Because the SWRCB failed to act for over 1 year on SCE's request for a WQC, FERC waived the Project WQC requirement.

Table 5.5-1. Summary of License Requirements

Requirement Type	Requirement	Amendment History
Article 101 Special Use Authorization from Inyo National Forest	Requires licensee to obtain a special-use authorization from the Forest Service for the occupancy and use of Forest Service lands. Land-disturbing activities may commence 60 days following the filing date of such authorization.	FERC Order on Rehearing issued February 1, 1995: Removed this article from the license.
Article 102 Written Approval of Forest Service for Project Components Occurring on National Forest System Land	Requires licensee to obtain the prior written approval of the Forest Service for all final design plans for Project components which the Forest Service deems as affecting or potentially affecting Forest Service resources.	Amended November 20, 1998: Replaces the article’s reference to the Forest Service special use authorization with the requirement to follow the written instructions provided by the Forest Service.
Article 103 Written Approval of Forest Service for Changes in Location of Project Features	Requires licensee to obtain written approval from Forest Service prior to making any changes in the location of any constructed Project features or facilities, or in the uses of Project lands and waters, or any departure from the requirements of any approved exhibits filed with FERC.	
Article 104 Annual Consultation	Requires consultation with the USFS regarding measures needed to ensure protection and development of the natural resource values of the Project area. Annual reports are due by July 15 each year.	FERC Order issued November 22, 2005 Consolidated the annual consultation meetings with Forest Service and the annual spring meetings with Forest Service and the California Department of Fish and Game for the Lee Vining, Rush Creek, Lundy and Bishop Creek Projects into a single meeting to be held annually by May 15 to fulfill the requirements of the Section 4(e) conditions and license Articles 104 and 105. Annual reports are due no later than July 15 each year.
Article 105 Maintain Minimum Flows and Summer Operations and Maintenance Plan	Establishes minimum flows and requires annual meeting with USFS and CDFW to develop summer O&M plan, water management of reservoirs, and flushing flows.	

Requirement Type	Requirement	Amendment History
Article 105 (continued) Temporary Modification of Minimum Flows	Provides for temporary modification of minimum flows, if required by operating emergencies beyond the control of the licensee; or for short periods upon written consent of the USFS.	
Article 105 (continued) Riparian and Aquatic Monitoring Plan	Required implementation of 1993 plan as described by USFS revised conditions. By Order dated January 16, 2014 the plan was revised to reflect USFS's May 31, 2013 letter regarding abiotic, vegetation and aquatic monitoring at the Project. Monitoring and ongoing reporting is required for term of license. The purpose of the monitoring is to determine if goals and objectives of the minimum flow requirements on riparian dependent species have been met. As needed licensee will propose changes in flows to meet the objectives. Annual reports of streamflows are filed with the Inyo National Forest.	Amended January 16, 2014: Revises the plan The revised plan discontinues monitoring at three sites on Bishop Creek which have been subject to vandalism and disturbance. The revised plan reduces monitoring parameters on lower Birch Creek to those most meaningful for evaluating current conditions. Finally, the revised plan discontinues aquatic monitoring and fish sampling at McGee Creek, Reach 4 of Bishop Creek, and sites 3 and 5 on Bishop Creek.
Article 106 Installation of Stream Gage Device	Provides for installation of stream gages downstream of the point of release of all bypass flows and below South Lake Dam and Lake Sabrina Dam.	Amended on October 6, 1999 Annual reports to be filed by April 1 for the preceding year instead of December 31 for the same year. Amended on November 20, 1998 Install an orifice type flow release device at the McGee Creek diversion instead of a continuously-recording stream gauge.
Article 107 Recreation Resource Protection and Mitigation-Recreation Resource Protection and Mitigation Access Trails Operation and Maintenance Costs	Required licensee to provide funding for trail construction and facilities construction. Required annual funding to USFS to pay for USFS operations and maintenance expenses.	Amended on November 20, 1998 Established an alternative funding arrangement, requiring the licensee to reimburse the Inyo National Forest for one-half of its annual costs to operate and maintain day-use recreation facilities at the South Lake and Sabrina reservoirs.
Article 108 Recreation Resource Protection and Mitigation Erosion, Stream	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the USFS for the control of erosion, stream sedimentation, dust, and soil mass movement.	

Requirement Type	Requirement	Amendment History
Sedimentation, Dust, and Soil Mass Movement Control Plan		
Article 109 Solid Waste and Waste Water Disposal Plan	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the USFS for the treatment and disposal of solid waste and waste water generated during construction and operation of the Project.	
Article 110 Hazardous Substances Plan Updates	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the USFS for oil and hazardous substances storage and spill prevention and cleanup.	
Article 111 Spoil Disposal Plan	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the USFS for the storage and/or disposal of excess construction/tunnel spoils and slide material.	
Article 112 Visual plan	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the Forest Service for the design and construction of the Project facilities to preserve or enhance its visual character.	
Article 113 Threatened, Endangered, and Sensitive Species Management Plan	Before starting land disturbing activities on USFS lands, submit a plan to FERC; plan approved by the USFS for the mitigation of impacts to sensitive, threatened, and endangered plant and animal species located within the area to be disturbed.	
Article 114 Minimum Flow Requirement	A minimum flow of 18 cfs (or the natural flow, whichever is less) must be maintained in Bishop Creek on the BLM lands in stream reach 2 (below Plant No.4).	FERC Order issued February 1, 1995 This Article was removed from the license due to a conflict with the Energy Policy Act of 1992.
Article 115 Right-of-Way Grant	Within 6 months of issuance of the license, the licensee will obtain a right-of-way grant from the BLM for the penstock, transmission lines and other facilities on BLM land, as required by Sections 501 and 511 of the Federal Land Policy and Management Act of 1976 (PL 94-579).	

Requirement Type	Requirement	Amendment History
Article 116 Authorization to Remove Mineral Materials	Prior to removal of any mineral materials from the BLM land, the licensee shall obtain authorization from the BLM.	
Article 117 FS Conditions Pertain to BLM Conditions	The FS 4(e) conditions, articles 101 through 113, shall also pertain to BLM lands unless those conditions conflict with BLM conditions, articles 114 through 117.	
Article 201 Annual Charges	Requirement to pay the United States annual charges as determined by FERC.	Amended February 28, 2002 Revisions that incorporate the removal of transmission lines will be made when the time arises. In the interim, the amendment corrects the acreage of federal lands occupied by the Project based on SCE's revised survey information, the addition of 1.17 acres for the gauging stations and access roads, the removal of 33.18 acres because company housing has been demolished, and the removal of 1.07 acres associated with the Horse Creek Diversion. Amended May 19, 1999 to reflect changes in the Project's installed capacity. Amended March 18, 1996 to reflect changes in the Project's installed capacity. Amended September 19, 1995 to reflect changes in the Project's installed capacity.
Article 202 Reasonable Rate of Return	A specified reasonable rate of return upon the net investment in the Project shall be used for determining surplus earnings of the Project for the establishment and maintenance of amortization reserves.	
Article 203 Decommissioning of the Project	FERC reserves authority, in the context of a rulemaking proceeding or a proceeding specific to this license, to require the licensee at any time to conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning of the Project.	
Article 204	Grants the licensee authority to grant permission for certain types of use and occupancy of Project lands	

Requirement Type	Requirement	Amendment History
Authority to Grant Permission for Use and Occupancy	and waters and to convey certain interests in Project lands and waters for certain types of use and occupancy, without prior FERC approval.	
Article 401 Minimum Flow Modifications	The minimum flows required by Articles 105 and 114 may be modified for short periods upon mutual agreement among the licensee, the Forest Service, the BLM, and the CDFW.	
Article 402 Approval to Modify Minimum Flows	The licensee shall obtain FERC approval before modifying any of the Project's minimum flows to meet the requirements of Articles 105 and 114 for achieving the vegetation potentials within the riparian zones affected by the Project.	
Article 403 Streamflow Gaging Plan	Required a plan to install, operate, and maintain streamflow gages necessary to monitor the minimum flow releases required in Articles 105 and 114.	Amended on November 18, 2016 Installation of new release pipe and a continuously recording AVM immediately downstream of the Intake No. 5 diversion dam. The new AVM to be used in lieu of the previously installed fluid gage and A-35 water level recorder, located approximately 300 feet downstream of the dam.
Article 404 Monitoring Plan for Turbine-Induced Injury and Mortality to Fish Resources	Requires the licensee to file with FERC, within 6 months from license issuance, a monitoring plan to evaluate turbine-induced injury and mortality to fish resources and their impact on fish abundance in Bishop Creek. The plan shall be developed in consultation with the FS, BLM, and CDFW. The licensee shall allow at least 30 days for the agencies to comment and make recommendations prior to filing the plan. If applicable, the filing must include the licensee's reasons for not adopting an agency recommendation. Also requires stocking of fish in consultation with CDFW.	Updated January 19, 2000 The licensee may stock 2,500 brown trout once every 5 years instead of 500 annually. FERC Order issued August 16, 1995 modifying and approving, in part, fish mortality monitoring plan. FERC order issued May 19, 1999 modifying and approving final entrainment report Beginning in 1999, the licensee shall stock 500 8-inch brown trout annually at times and locations determined in consultation with the CDFW. (This requirement was changed with the 2000 amendment.)
Article 405	Requires the filing of annual riparian vegetation monitoring reports required by Article 105.	Amended on January 16, 2014

Requirement Type	Requirement	Amendment History
Riparian Monitoring Plan		to require the licensee to implement the revised riparian and aquatic monitoring plan attached to Article 405 in the FS's May 21, 2013 letter regarding abiotic, vegetation, and aquatic monitoring at the Project.
Article 406 Raptor Protection Plan	Requires a report outlining the modifications made to the Project transmission line to protect raptors.	
Article 407 Transmission Line Construction	The licensee shall design and construct the relocated segment of the Project transmission line in accordance with guidelines set forth in "Suggested Practices for Raptor Protection on Power Lines--the State of the Art in 1981," by Raptor Research Foundation, Inc. The licensee shall consult with the USFWS, the CDFW and the Forest Service in adopting these guidelines and shall develop and implement a design that will provide adequate separation of energized conductors, ground wires, and other metal hardware, adequate insulation, and any other measures necessary to protect raptors from electrocution hazards. Within 90 days after completion of construction, the licensee shall file as-built drawings of the relocated segment of the transmission line with FERC.	FERC Order on Rehearing issued February 1, 1995 Removed this Article from the license.
Article 408 Recreation Facilities	Within 6months after the Forest Service completes construction of the recreational facilities mentioned in Article 107, the licensee shall file with FERC drawings, showing the type and location of the completed facilities. At the same time, the licensee shall provide copies of the filing to the California Department of Parks and Recreation and the CDFW.	FERC Order on Rehearing issued February 1, 1995 Removed this Article from the license.
Article 409 Erosion, Stream Sedimentation, Dust, and Soil Mass Movement Control Plan	Requirement to file, at least 60 days prior to the start of construction of recreational facilities, the plan to control erosion, stream sedimentation, dust, and soil mass movement required by Article 108.	FERC Order on Rehearing issued February 1, 1995 Removed this Article from the license.
Article 410	Requires implementation of the cultural resources management plan, filed with FERC on April 3, 1989, to avoid and mitigate impacts of the Project on nine	Memorandum of Agreement approved April 12, 1995

Requirement Type	Requirement	Amendment History
Cultural Resources Management Plan	archeological sites and the Bishop Creek Hydroelectric System Historic District determined eligible for inclusion in the National Register of Historic Places. The Article also mandates periodic monitoring be undertaken of each NRHP eligible site, as well as one site-specific measure.	Amends Cultural Resources Management Plan
Article 411 Cultural Resources Survey	Requirement to conduct a cultural resources survey where recreation facilities will be located prior to their construction. The survey shall be based on the recommendations of the California State Historic Preservation Office (SHPO) and the Forest Service. The survey shall be documented in a report and include a cultural resources management plan to avoid or mitigate any impacts to archeological or historic sites identified during the survey as eligible for inclusion in the NRHP.	FERC Order on Rehearing issued February 1, 1995 Removed this Article from the license.
Article 412 Cultural Resources Management Plan	Before starting any land-clearing or land-disturbing activities within the Project boundaries, other than those specifically authorized in this license, licensee must consult with the California SHPO, USFS, and Inyo National Forest, conduct a cultural resources survey of these areas, and shall file for FERC approval of cultural resources management plan to avoid or mitigate impacts to any significant archeological or historic sites identified during the survey.	
Article 501 Reimbursement of Owner of Headwater Improvement	Requirement for the licensee to reimburse the owner of headwater improvement for benefits to the licensee’s Project.	

Source: SCE 2019

In addition to the numbered license Articles in Table 5.5-1, the following FERC Orders have modified the Bishop Creek Project license:

- Amended September 4, 2013; incorporated Memorandum of Agreement (MOA) addressing the effects of intake structure modification work at the South Lake reservoir.
- Amended April 15, 2011; incorporated MOA to resolve adverse effects to Hillside dam, a historic property, of installing a geomembrane liner on the face of the dam.
- FERC Order issued April 2, 2010. Set effective date for deletion of the transmission lines on December 5, 2001 and March 12, 2007; approved revised FERC Exhibit G drawings; and revised annual charges accordingly.
- Amended on May 18, 2004; resolved adverse effects on the Bishop Creek Historic District of replacing the intake structure for Bishop Creek Plant No. 2.
- Amended on February 28, 2002; incorporated revised FERC Exhibits A, F and G, which provided transmission line changes and the removal of the diversion at Horse Creek into the license.

5.5.1.2 Water Rights

5.5.2 Operating and Water Delivery Agreements

Bishop Creek Project operations are subject to adjudicated water rights and other agreements that provide for non-power uses. The Chandler Decree is one of the primary controlling documents and the Sales Agreement addresses SCE's obligations with respect to the waters of Bishop Creek. Within these constraints, SCE manages the releases from the storage reservoirs for purposes of hydrogeneration and meeting water allocation requirements.

The Sales Agreement provides for seasonal maximum carry-over limits of 2,147 acre-feet, as measured on or about April 1, annually. Variances from this requirement have been obtained on a case-by-case basis in the past, by mutual-agreement between SCE and LADWP. Additionally, SCE meets with the USFS annually to determine seasonal minimum storage requirements for recreation purposes and annual flushing flows.

The Chandler Decree and SWRCB water rights licenses determine how flows are allocated and used, as follows:

- Seasonal diversion/accumulation limit not to exceed historically measured use (i.e., not to exceed current Project capacity), including an annual limit of 1,400-acre feet from Green Creek.
- Instantaneous diversion limit at all locations not to exceed historically measured use (i.e., not to exceed current Project capacity), including a daily average limit of 1 cfs for domestic use.

- Minimum Project flow-through (downstream delivery) requirements, for senior downstream water rights holders, are measured below Plant No. 6, as required by the Chandler Decree (Table 5.5-2).

- Minimum instream flow requirement of 0.25 cfs at the Birch-McGee diversion, for senior downstream water rights holders, as stipulated by the Chandler Decree.

- Minimum instream flow requirement of 1.6 cfs during the irrigation season, and 0.4 cfs at other times, through the Abelour ditch, for senior downstream water rights holders in the Rocking K Subdivision.

Table 5.5-2. Daily Average Flow Requirements for Flow Below Plant No. 6

Period	Daily Average Flow (cfs)	Instantaneous Minimum Flow (cfs)
April 1-15	44	33
April 16-30	68	51
May 1-15	87	65
May 16-31	98	74
June 1 - July 31	106	90
August 1-31	106	80
September 1-15	76	57
September 16-30	58	44

Source: Chandler Decree 1922

5.5.2.1 Existing FERC License Articles

SCE adheres to the minimum instream flow requirements mandated by the Articles 105 of the FERC License, as follows:

- Lake Sabrina to Intake 2: no less than 13 cfs or natural flows, whichever is less, year-round

- South Lake to South Fork diversion: no less than 13 cfs or natural flows, whichever is less, year- round

- Intake No. 2: no less than 10 cfs from Friday of the last weekend in April thru October 31; no less than 7 cfs for the remainder of the year; or no less than 5 cfs in all months in dry years

- Plant No. 2 to Plant No. 3: no less than 13 cfs year-round

- Plant No. 3 to Plant No. 4: no less than 5 cfs year-round

- Plant No. 4: no less than 12 cfs year-round (Article 105)12

- McGee Creek diversion: no less than 1 cfs or the natural flow, whichever is less, year-round

- Birch-McGee diversion: no less than 0.25 cfs or the natural flow, whichever is less, year-round

5.5.3 Water Management

Flow varies monthly, depending on the amount of runoff and SCE's release schedule, which is dictated by snowpack, snow melt, spring rain events, drought, power demand, and irrigation. At the lower end of the system, the peak runoff occurs from May to August. Annual runoff averages 100 cfs, with calculated monthly mean flows ranging from 41 cfs to 285 cfs.

The regulated reaches between Lake Sabrina and Intake No. 2, and between South Lake and South Fork diversion experience similar flow fluctuations. Because these reaches aggregate and convey all Bishop Creek Project flows, they are never as low as the flows in the diverted sections. During wet years, the regulated reaches have much higher flows. The current license requires minimum flow releases into diverted reaches, which are discussed further below in Section 5.7.1.1. - Minimum Instream Flow Requirements (SCE 2019).

5.5.4 Estimate of Dependable Capacity

The Bishop Creek Project's five plants have a licensed capacity of 28.6 megawatts (MW (FERC 1994). Since the last license, minor changes in how generation equipment and capacities are estimated has resulted in revised estimates of an installed capacity of 28.92 MW. The Bishop Creek Project has a dependable capacity of 28.92 MW, where maximum dependable operating capacity is defined to be the maximum load-carrying capacity of each generating unit, based upon single unit load tests during unrestricted conditions of maximum reservoir and/or forebay head and maximum manufacturer-rated capabilities of the turbines, generators, and other power plant components. Historically, Bishop Creek Project produced approximately 164 gigawatt hours (GWh) of renewable energy annually. Six years of power generation, by plant, are provided in Table 5.6-1

[12] Article 114 required 18 CFR (or the natural streamflow, whichever is less), however this license condition was removed by Order dated February 1, 1995 because of a conflict with the Energy Policy Act of 1992, which changed how the Federal Land Policy and Management Act (FLPMA) treated lands which had been previously subject to a reservation under Section 24 of the FPA. The remaining language in Article 105 ambiguous as to whether the minimum flow requirement is 12 cfs or some greater amount negotiated with the CDFW. Historically SCE has been releasing 18 cfs.

5.6 PROJECT GENERATION AND OUTFLOW RECORDS

Flow varies monthly, depending on the amount of runoff and SCE's release schedule, which is dictated by snowpack, snow melt, spring rain events, drought, power demand, and irrigation.

Figure 5.6-1, Figure 5.6-2, and Figure 5.6-3 illustrate the operating rule curve for mean, high, and low water years.

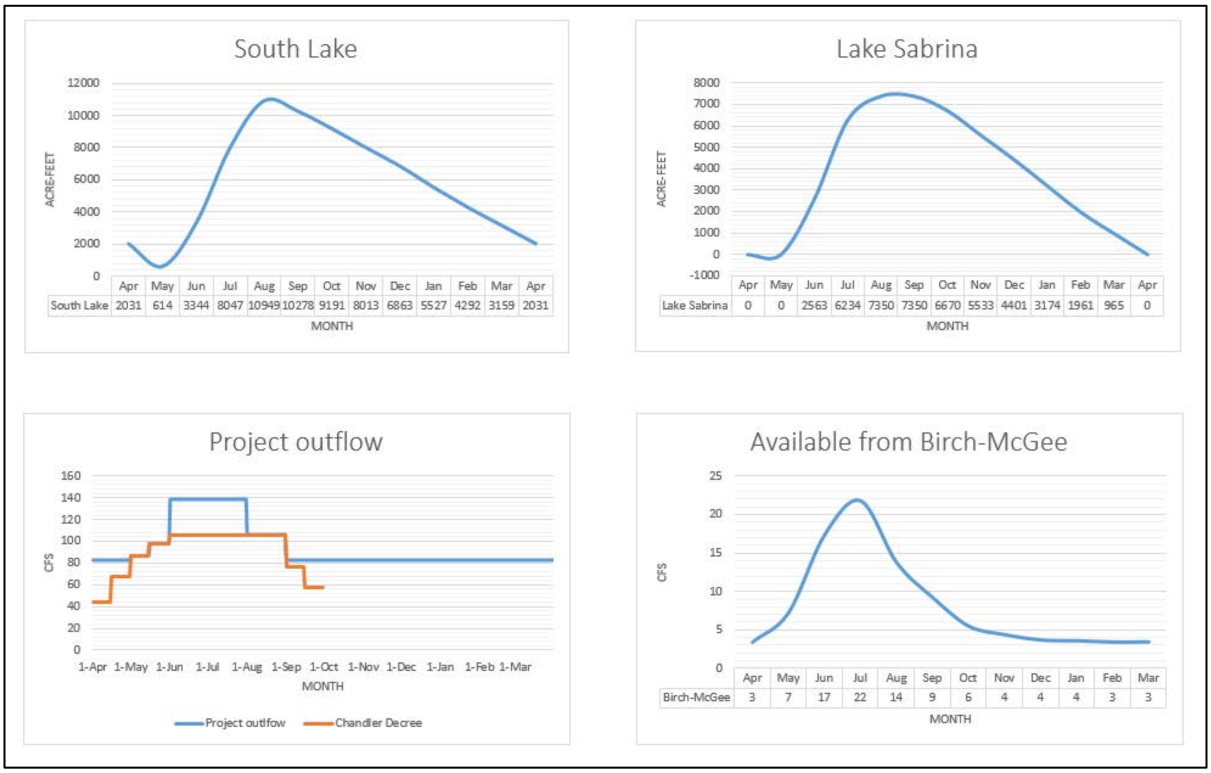

Figure 5.6-1. Operating Rule Curve – Mean Water Year.

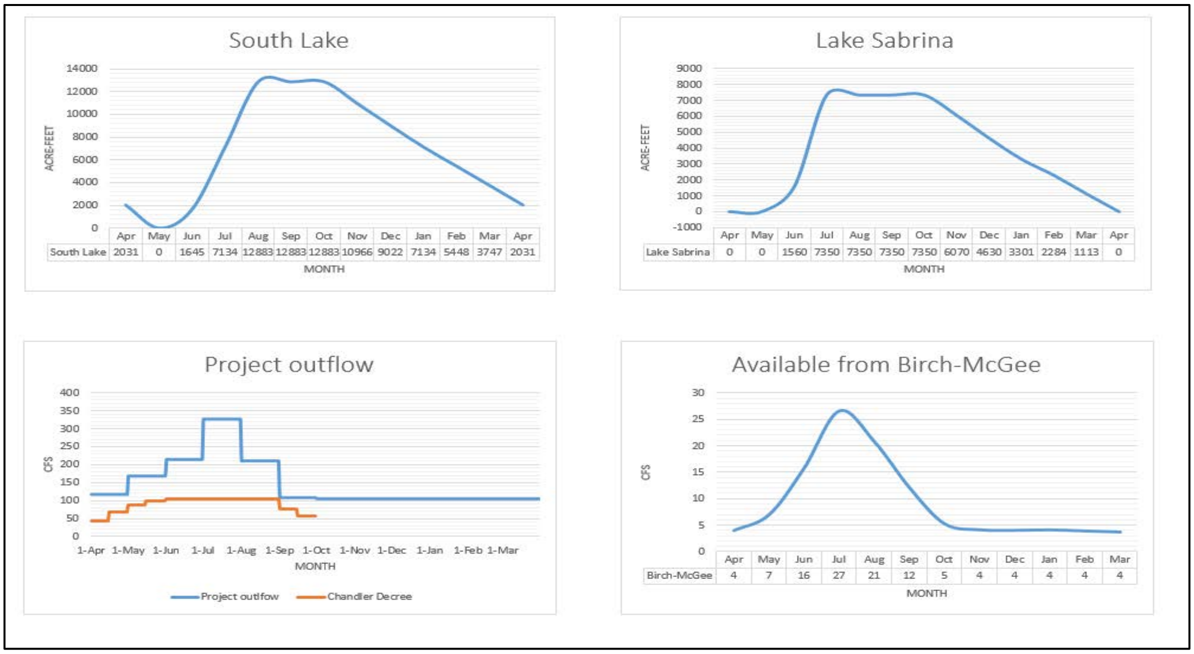

Figure 5.6-2. Operating Rule Curve – High Water Year.

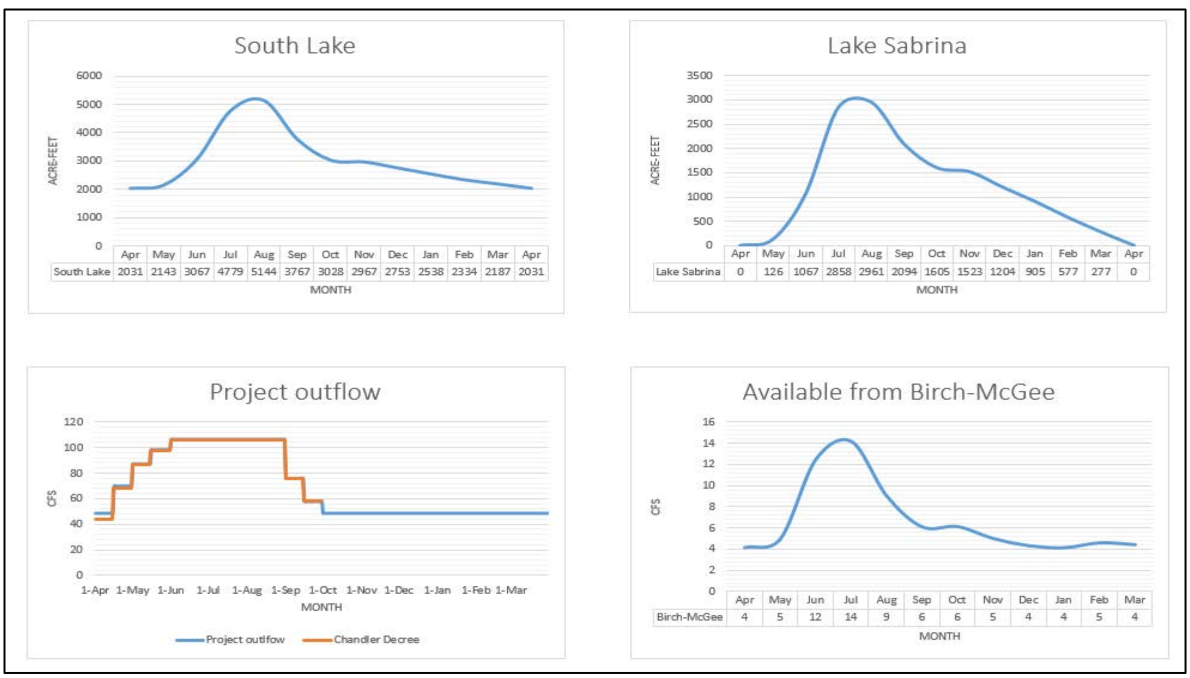

Figure 5.6-3. Operating Rule Curve – Low Water Year.

Six years of Project generation and outflow data are summarized in Table 5.6-1**.**

Table 5.6-1. Bishop Creek Generation KWH Average (2014-2019)

	PLANT No. 2	PLANT No. 3	PLANT No. 4	PLANT No. 5	PLANT No. 6	TOTAL
January	1,247,735	1,109,783	1,649,958	470,292	105,463	**4,583,231**
February	958,616	794,024	1,617,615	502,270	389,464	**4,261,989**
March	1,571,072	1,330,392	1,062,089	804,694	439,487	**5,207,734**
April	2,396,292	2,223,829	2,310,903	850,327	726,463	**8,507,814**
May	3,625,218	3,684,887	4,178,310	1,867,785	984,510	**14,340,710**
June	3,887,044	3,996,481	4,716,001	1,911,704	1,022,683	**15,533,913**
July	3,845,663	3,521,047	5,002,167	1,817,364	1,109,963	**15,296,204**
August	3,567,318	3,447,802	4,657,662	1,675,976	1,149,412	**14,498,170**
September	2,247,382	2,256,470	2,953,789	1,142,166	831,474	**9,431,281**
October	1,422,091	1,488,622	2,444,727	624,461	628,821	**6,608,722**
November	1,246,397	1,332,300	2,079,904	513,362	376,855	**5,548,818**
December	1,107,546	1,384,568	2,117,737	556,016	769,134	**5,935,001**

5.7 EXISTING ENVIRONMENTAL MEASURES AT BISHOP CREEK PROJECT

5.7.1 WATER RESOURCES

5.7.1.1 Minimum Instream Flow Requirements

Articles 105 and 114, contained in the 1994 license, require minimum instream flow releases in different reaches of Bishop, McGee, and Birch creeks. In addition, Article 106 requires the construction of continuously recording stream gage devices downstream of the points of release of all instream flows to accurately measure these flows. All of the following flows are defined in Articles 105, except Plant No. 4 to Plant No. 5, which is defined in Article 114 (Table 5.7-1).

Table 5.7-1. Summary of Minimum Instream Flow Requirements

Reach (Upstream to Downstream)	Minimum Flow (CFS)	Duration
South Lake to S. Fork Diversion	13 cfs or natural flow, whichever is less	Year round
South Fork below the South Fork Diversion	10 cfs	Last Friday in April through October 31
	7 cfs	November 1 through last Thursday in April
Lake Sabrina to Intake No. 2	13 cfs or natural flow, whichever is less	Year round
Below Intake No. 2**	10 cfs	Last Friday in April through October 31
	7 cfs	November 1 through last Thursday in April
	5 cfs	Year-round in dry years*
Below Intake No. 3 (Plant 2 to Plant 3)	13 cfs	Year round
Below Intake No. 4 (Plant 3 to Plant 4)	5 cfs***	Year round
Below Intake No. 5 (Plant 4 to Plant 5)	12 cfs	Year round
Below Intake No. 6 (Plant 5 to Plant 6)	No flow requirement	n/a
McGee Creek Diversion	1 cfs or natural flow, whichever is less	Year round
Birch Creek Diversion	0.25 or natural flow, whichever is less	Year round

* Defined as "less than 75% of April 1st (normal) snow water equivalent"
** The flows in the reach below the confluence of the Bishop Creek South Fork, and Middle Fork of Bishop Creek are the sum of releases from Intake No. 2 and releases from the South Fork diversion
*** Receives an additional 5 cfs inflow from Coyote Creek

Article 106 requires submittal of a stream flow report by December 31 of each year for the preceding water year to the Forest Supervisor, INF. In addition, all records generated from the stream gages will be reviewed annually by the USGS and published in the annual USGS Water-Data Reports prepared in cooperation with the California Department of Water Resources and other agencies. Detailed tables and discussions of Bishop Creek Project gages are provided in Section 5.2.7 - Gages.

5.7.1.2 Erosion Protection and Remediation

In general, the Bishop Creek Project is not known to have an adverse effect on erosion within the Project streams. However, during the PAD development, SCE, along with early consultation groups, identified sediment management as an area of potential interest. Aside from minimum flow requirements of Article 105, there are no license requirements to move sediment throughout the Project, although the long-term agreement provides a mechanism for SCE to manage sediment during operations and management procedures through flushing flows. Additionally, Article 108 of the existing license requires the submission of plans to USFS and FERC for the control of erosion, stream sedimentation, dust, and soil mass movement before starting land disturbing activities on USFS lands.

5.7.2 Cultural Resources

Numerous previous cultural resource studies have been conducted; however, most of these occurred more than 10 years ago. The Bishop Creek Project PAD identified the need for additional cultural resource studies to update and supplement existing information for the Project area. SCE is in the process of conducting outreach efforts with local tribes, Basque, recreationists, and ranchers to identify potential traditional cultural properties (TCPs) and other cultural resources within the Bishop Creek Project study area. Preliminary results are expected in spring of 2022.

5.7.2.1 Historic Properties Management Plan

In 1989, SCE developed a HPMP in compliance with NHPA Article 106. The HPMP required archaeological and historic inventory of the Bishop Creek Project area, and development of appropriate management measures. Thirty-one archaeological sites were identified, along with numerous historic structures and facilities associated with hydroelectric development. Evaluation of these resources, in consultation with the INF and SHPO, led to determination that 9 archaeological sites and 68 historic structures were eligible for listing on the NRHP. The HPMP developed management strategies to avoid impacts to eight of the nine archaeological sites and for a data recovery program at the one site in which impacts could not be avoided (White 1989).

In 2019 and 2020, SCE and stakeholders identified a need to conduct cultural resource studies during the Initial Study Report (ISR) development. The results of the Cultural Resources Study Report will be used to develop an updated HPMP which will consider the direct and indirect effects of continued Project operations and maintenance for the NRHP listed or eligible tribal resources, including public recreation activities, that may have an adverse effect on historic properties. Further discussion of tribal and cultural resources is provided in Section 8.11 – Cultural Resources of this document.

5.7.2.2 Ground-Disturbing Activities Consultation

According to SCE’s 1989 HPMP, the general management measure for known NRHP eligible sites is avoidance of effect. Most features identified were not being affected by normal Project operations at the time of the 1989 report. Nonetheless, SCE utilized internal communication to share the vicinities of avoidable NRHP eligible sites, by marking “Environmental Sensitivity Areas” on Project maps and providing copies to plant managers. In addition, the SCE’s Hydro Generation Department notifies SCE’s Environmental Affairs Division in advance of any ground disturbing activities planned in an Environmentally Sensitive Area. Upon investigation, SCE Environmental Affairs Division will initiate consultation with the INF and/or SHPO if warranted (White 1989).

5.7.3 Terrestrial Resources

5.7.3.1 Wildlife Protection and Monitoring

Existing protection measures include nesting bird surveys, raptor surveys, other sensitive species surveys, fish protection, restoration for impacts, implementation of BMPs for work in and around stream and lakes, and monitoring, and reporting to SCE, CDFW, USFS and other resource agencies, as appropriate. These activities and associated BMPs are described in the following resource management plans for use by Bishop Creek Project personnel:

- Avian Protection Plan and Bird Nesting Guidelines (includes provisions for reporting wildlife and avian interactions within the Bishop Creek Project).
- Vegetation Management Operations Manual
- Invasive Mussel Prevention Plan

5.7.3.2 Avian Protection Plan

SCE developed an Avian Protection Plan that is implemented at the Bishop Creek Project in accordance with primary federal laws protecting birds; Bald and Golden Eagle Protection Act (BGEPA), ESA, and Migratory Bird Treaty Act (MBTA). SCE established roles for various SCE personnel to follow state and federal laws as they relate to the protection of bird species within the Bishop Creek Project. Major procedures discussed in this document include permits, avian mortality, proactive retrofits, bird nest removal, injured birds, and ground-disturbing activities. By following this plan, SCE will effectively protect avian species within the Bishop Creek Project.

SCE will continue to implement its Avian Protection Plan.

5.7.3.3 Nesting Bird Management Guidance for Small Projects

SCE's Nesting Bird Management Guidance for Small Projects was approved in April 2016. SCE defines management of nesting birds as "avoiding or minimizing project activities that have the potential to cause active nest failures as well as to minimize or avoid construction delays". The purpose of this guidance document is to prevent take of active nests, eggs, nestlings, or nesting birds as a result of construction activities. SCE's avian biologist defined a buffer around existing nests based on guidelines provided in this document. Buffers define the minimum horizontal distance for ground construction and restrict the use of moderate to heavy machinery that may disturb the specific species. Buffer size varies depending on the vertical distance from construction, species threshold of disturbance, amount of cover around nest, line of sight to construction, observed activity of an individual bird, acclimation of individual to disturbance, nest monitoring results, and nest susceptibility to failure. These buffers may be adjusted based on construction, nest activity, and nest development. Routine observations are conducted to identify new nests and the status of known nests.

SCE will continue to implement its Nesting Bird Management Guidance for Small Projects. Pre-activity nesting bird surveys during the recognized nesting season, adjusted for altitude across the Bishop Creek Project.

5.7.3.4 Invasive Mussel Prevention Plan

SCE implemented an Invasive Mussel Prevention Plan (Prevention Plan) in July 2017 that outlines the prevention of introduction and spread of invasive quagga and zebra mussels into Bishop Creek Project lakes. Quagga and zebra mussels have rapidly spread throughout the eastern United States, and once established, have the potential to result in physical damage to intake pipes and similar hard surfaces that comprise the Project's infrastructure. Establishment of mussel species is most often the direct result of transportation via boats or vessels. Most Project lakes are open to the public for recreation, so transportation of these species is possible. Lakes operated by SCE are hydrologically connected and are susceptible to sequential infestation.

SCE assessed each lake for their vulnerability to be invaded. Results from this study indicate that all Bishop Creek Project lakes are low risk for establishment and introduction. Even with low risk, SCE continues to provide public education and outreach through signs, kiosks, and brochures that explain the economic damage that invasive mussel species can cause and how to prevent their spread.

5.7.4 Land Management

Land ownership within the Bishop Creek Project boundary is predominantly composed of federal lands jointly administered by the INF and BLM; a small portion of INF lands within the Project boundary are managed as a National Wilderness Area (John Muir Wilderness). The remainder of lands are owned by either SCE, the LADWP, or private landowners. Project lands are subject to compliance with the Inyo County General Plan Update of 2001, the 2019 INF Land and Resource Management Plan, and BLM's 1993 Resource Management Plan. Because all shoreline property is owned either by INF or by SCE, no formal permitting process or Shoreline Management Plan is required for the Bishop Creek Project. Further discussion of land ownership, use, and management is described in Section 8.9 – Recreation and Land Use of this document.

5.8 Other SCE Company-Wide Environmental Programs

5.8.1 Environmental Training Program

SCE has implemented several internal sustainability programs, including supporting low-impact development and sustainable landscaping programs; workplace recycling; and environmentally friendly supply chain practices (SCE 2020a).

SCE provides access to environmental training for the public though its Energy Education Centers program. Trainings focus on energy management and efficiency technologies. For in-person instruction, courses and workshops are held at Energy Education Centers in Irwindale and Tulare. Online learning is also available. Lessons are open to the public, and free to attend. The Irwindale center features a full-scale, operational, demonstration for an energy-saving home which the public can visit (SCE 2020b).

5.8.2 Transmission, Power, and Communication Line Maintenance Program

Pursuant to Appendix XI of SCE's Transmission Owner Tariff (TOT), SCE provides an annual report covering its Transmission and Compliance Program (TMCR). The goal of the report is to provide public stakeholders additional transparency regarding transmission capital expenditures. These expenditures are predominantly related to maintenance and regulatory compliance requirements to operate a safe and reliable transmission system. This work involves replacing aging infrastructure, repairing and maintaining equipment in accordance with compliance requirements, upgrading transmission facilities owned by others for which SCE has a contractual entitlement, mitigating the impact of wildfire, and securing its assets and facilities from seismic and security concerns.

Transmission projects reviewed by the California Independent System Operator Corporation (CAISO) pursuant to its tariff are not in scope for SCE's TMCR stakeholder process. Other exemptions to the TMCR process include: (1) facilities or projects that require an in-service date less than 2 years after their need is identified; (2) facilities or projects (a) that have less than 30 percent of their total individual capital costs included in SCE's wholesale transmission rate base and (b) where FERC jurisdictional portion of the project's estimated individual cost is less than $1 million; and (3) facilities or projects that address the physical security and cyber security needs of the transmission system.

SCE's TMCR process does not impact or restrict any stakeholder's Section 206 rights or right to intervene and/or protest in any of SCE's regulatory proceedings, including SCE's transmission rate filings. (SCE 2020c)

5.9 References

Chandler Decree 1922. Hillside Water Company v. William A. Trickey et.al, U.S. District Court, Southern Division of California (Northern Division), No. B-61 EQ, Final Decree in Equity (Chandler Decree), January 27, 1922 (Unreported).

Federal Energy Regulatory Commission (FERC). 2010. Order Setting Effective Date for Deleted Transmission Lines, Approving Revised Exhibits, and Revising Annual Charges. 131 FERC ¶ 62,007. Project Number 1394-004.

Federal Energy Regulatory Commission (FERC). 1994. Order Issuing New License (Major Project). 68 FERC ¶ 62,058. Project Number 1394-004.

Southern California Edison (SCE). 1995. Implementation Plan to Comply with Minimum Instream Flow Release Requirements, Bishop Creek Hydroelectric Project (FERC Project No. 1394).

Southern California Edison (SCE). 2019. Pre-Application Document for the Bishop Project. May.

Southern California Edison (SCE). 2020c. 2020 Transmission Maintenance and Compliance Review (TMCR) Report. Available online at: https://www.sce.com/sites/default/files/inline-files/2020TMCRReportFinal.pdf

Southern California Edison (SCE). 2020b. Energy Education Centers. Available online at: https://www.sce.com/business/news-events/Energy-Education-Center

Southern California Edison (SCE). 2020a. Corporate Responsibility. Available online at: https://www.sce.com/about-us/who-we-are/corporate-responsibility/protecting-the-environment

White, David R. M, Ph.D., Engineering, Planning, and Research Department, Southern California Edison. 1989. Management Plan for Historic and Archaeological Resources Associated with the Historic and Archaeological Preservation Plan for the Bishop Creek Hydroelectric Project (FERC Project 1394), Inyo County, California.

6.0 PROPOSED ACTION

The Proposed Action represents SCE's recommendations for continued operations and maintenance of the Project, including new environmental measures and plans.

Under the Proposed Action SCE proposes to continue to operate and maintain the Bishop Creek Project similar to the No-Action Alternative, with the few exceptions described below. The current license for the Bishop Creek Project expires on June 30, 2024.

Using the No-Action Alternative described in Section 5.0 as a baseline, this section identifies changes that will occur to the Project under the Proposed Action, including:

- Modification to the existing FERC Project boundary;
- Additional Project maintenance activities; and
- New or modified environmental measures and plans designed to protect, maintain, avoid, or minimize adverse effects, or enhance environmental and cultural resources.

6.1 FERC Project Boundary Modifications

Pursuant to 18 CFR § 4.41, the Project boundary must encompass all lands necessary for Project purposes, including the O&M of the Project over the term of the FERC license. SCE has reviewed the existing FERC boundary and identified locations where lands should be added or removed from the Project boundary. Results of SCE's review are summarized in Section 8.9.7.3 – Evaluation of the Accuracy of the Current Project Boundary of this Exhibit E. Proposed changes include the following:

- Identification of areas that are currently being used for O&M activities that are not currently reflected in the boundary
- Slight adjustments where the current FERC boundary imperfectly captures the Project activity or facility
- Correction of mapping errors arising from updated spatial data and tools

SCE's proposed boundary modifications described above would result in the land ownership within the FERC boundary as described in Table 6.1-1. Land ownership of all parcels will be verified for the FLA.

Table 6.1-1. Land Ownership within Project Boundary

Ownership	Acreage	Percentage of Total
U.S. Forest Service	758.5	71.2
Bureau of Land Management	47.6	4.4
Non-federal	255.9	24.1
Total Project Acreage	***1065.2***	

6.2 PROJECT FACILITIES

SCE is not proposing changes in Project facilities as part of the new license.

6.3 PROJECT MAINTENANCE

SCE is not proposing significant changes in Project maintenance as part of the new license; however, SCE is clarifying that the Proposed Action includes both routine and as-needed maintenance to mechanical and structural elements, such as low-level-outlets (LLO), gates, and intakes as described in Section 5.4 – Project Maintenance. To the extent that these maintenance activities may mobilize sediment or have other potential environmental consequences, they are implemented in compliance with existing BMPs and SCE-wide practices.

6.4 PROJECT OPERATIONS

SCE is not proposing changes to Bishop Creek Project operations as part of the new license, nor would there be changes to generation. Under the Proposed Action, the Project will continue to be operated in compliance with regulatory requirements, agreements, and water rights to generate power.

6.5 NEW OR MODIFIED ENVIRONMENTAL MEASURES, MANAGEMENT AND MONITORING PLANS, AND PROGRAMS

summarizes environmental measures and plans that will be implemented under the Proposed Action. These measures and plans are designed to protect, maintain, or enhance environmental and cultural resources of the term of the new license. Currently, SCE is not proposing any additional or new environmental measures, management or plans or monitoring programs. Appendix A (Volume 2) of this Exhibit E provides additional information regarding each of these proposed measures.

Table 6.5-1 summarizes environmental measures and plans that will be implemented under the Proposed Action. These measures and plans are designed to protect, maintain, or enhance environmental and cultural resources of the term of the new license. Currently, SCE is not proposing any additional or new environmental measures, management or plans or monitoring programs. Appendix A (Volume 2) of this Exhibit E provides additional information regarding each of these proposed measures.

Table 6.5-1. Summary of Environmental Measures and Plans Under the Proposed Action

PME Number	Resource	Description*
PME-1	Fish and Aquatics Aesthetics/Visual	Minimum Instream Flows Continue Instream Flow (modified)
PME-2	Fish and Aquatics	Gaging Plan (ongoing)
PME-3	Fish and Aquatics Botanical	Sediment Management Plan (new)
PME-4	Fish and Aquatics	Stocking Plan (ongoing)
PME-5	Wildlife	Wildlife Resource Management Plans (modified)
PME-6	Botanical	Botanical Resources Management Plan (modified)
PME-7	Botanical	Invasives Species Management Plan (new)
PME-8	Recreation	Recreation Resources Management Plan (new)
PME-9	Cultural and Tribal	Historic Properties Management Plan (modified)
PME-10	Aquatics	Invasive Mussels Prevention Plan

*A Detailed overview of each PME can be found in Volume 2, Appendix A.

7.0 OTHER ALTERNATIVES

7.1 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In the SD1 analysis, FERC proposed that the following alternatives be eliminated from detailed study in the environmental assessment.

7.1.1 FEDERAL GOVERNMENT TAKEOVER

In accordance with FERC Regulation § 16.14, a federal department or agency may file a recommendation that the United States exercise its right to take over a hydroelectric power project with a license that is subject to FPA Sections 14 and 15.[13] FERC's position regarding federal takeover of the Bishop Creek Project was included in SD1, where FERC stated that federal takeover of the Bishop Creek Project would not be a reasonable alternative. Federal takeover of the Project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that federal takeover should be recommended to Congress. No party has suggested that federal takeover would be appropriate, and no federal agency has expressed interest in operating the Bishop Creek Project.

7.1.2 ISSUING A NON-POWER LICENSE

A non-power license is a temporary license the FERC could terminate whenever it determines that another governmental agency is authorized and willing to assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this time, no governmental agency has suggested a willingness or ability to take over the Bishop Creek Project. Because no party has sought a non-power license, FERC has no basis to conclude that the Bishop Creek Project should no longer be used to produce power.

7.1.3 RETIREMENT OF THE PROJECT

Decommissioning of Bishop Creek Project could be accomplished with or without dam removal. Either alternative would require denying the relicense application and surrender or termination of the existing license with appropriate conditions. There would be significant costs involved with decommissioning the Project and/or removing any Project facilities. Bishop Creek Project provides a viable, safe, and clean renewable source of power to the region and if decommissioned, the Project would no longer be authorized to generate power.

As of this DLA, no party has suggested project decommissioning would be appropriate.

[13] 16 USC §§ 791(a)-825(r) (2012).

8.0 ENVIRONMENTAL ANALYSIS

8.1 INTRODUCTION

SCE began early engagement with stakeholders, agencies and interested parties in March 2018 and formed Technical Working Groups (TWGs) shortly after. The intent of this early outreach and these TWGs was to identify potential issues or potential project-related effects resulting from O&M of the Project to be analyzed and studied as part of the relicensing effort. FERC identified additional potential issues during the formal scoping process and identified those issues in Scoping Document 1 (SD1) issued on June 27, 2019.

Studies were developed to address these potential issues, which culminated in the Final Revised Technical Study Plan (TSP) that was filed with FERC on August 29, 2019. Those issues identified by FERC and the TWGs, the study plans developed to address them as well as the section of the DLA where that issue is discussed are all identified in Table .

The resources sections that follow examine the affected environmental of the Bishop Creek Project area, those potential issues identified above, and any PME measures proposed to avoid or minimize potential effects. Unless otherwise noted in each resource section, the Bishop Creek Project area includes the FERC Project boundary, as described in Section 5.3 - Project Boundary and shown in Figure 8.1-1.

Table 8.1-1. Potential Issues Identified by FERC or TWGs for the Project

Resource Area	Potential Issue	TWG or FERC Identified Issue	Study Plan Title	Location in this DLA
Geology and Soils	None identified	None	None	Section 8.3.1 - Bedrock Geology and Physiography
Water and Aquatic Resources	Effects of continued Project operation and facilities on water quality in Project reservoirs and Project affected stream reaches.	FERC SD1	AQ 5 – Bishop Creek Water Quality Technical Study Plan	Section 8.4.10 – Potential Adverse Effects on Water Quality
Water and Aquatic Resources	Effects of Project operation, including the current minimum instream flow releases and channel maintenance flows on resident fish and aquatic habitat in project affected stream reaches.	FERC SD1	AQ 1 – Instream Flow Needs Assessment Study Plan	Section 8.5.5 – Potential Adverse Effects on Fish and Aquatics
Water and Aquatic Resources	Effects of Project operation and facilities on upstream and downstream fish passage, including entrainment and turbine mortality.	FERC SD1	Addressed through literature review and summary of licensing studies from previous licensing efforts.	Section 8.5.5.4 - Potential Impacts of Project Operation and Facilities on Upstream and Downstream Fish Passage, Including Entrainment and Turbine Mortality
Water and Aquatic Resources	Effects of Project operation on fish populations in project reservoirs and Project affected stream reaches.	FERC SD1	AQ 3 – Bishop Creek Fish Distribution Baseline Study Plan AQ 4 – Bishop Creek Reservoirs Fish Distribution Baseline Study Plan	Section 8.5.5 – Potential Adverse Effects on Fish and Aquatics
Water and Aquatic Resources	Effects of Project operation and facilities on recruitment and movement of large woody debris and coarse sediment on aquatic habitat including macroinvertebrates.	FERC SD1	AQ 6 – Sediment and Geomorphology Study Plan	Section 8.3.7 – Potential Adverse Effects and Issues on Geology and Soils

Resource Area	Potential Issue	TWG or FERC Identified Issue	Study Plan Title	Location in this DLA
Water and Aquatic Resources	Effects of Project operation and facilities on the potential spread of invasive mussels to project reservoirs.	FERC SD1	Requested Study Not Adopted	Section 8.5.5 – Potential Adverse Effects on Fish and Aquatics
Botanical Resources	Effects of continued Project O&M on distribution of invasive plants in the Project area.	SCE/TWG	TERR 2 – Invasive Plants Study Plan	Section 8.6.3 – Potential Adverse Effects and Issues Regarding Botanical Resources
Botanical Resources	Potential impacts to changes in the riparian community as a whole, including black cottonwood.	SCE/TWG	TERR 1 - Assessment of Bishop Creek Riparian Community Study	Section 8.7.5 – Potential Adverse Effects and Issues to the Riparian Community
Botanical Resources	Effects of continued Project O&M on sensitive or special-status plants in the Project area	SCE/TWG	TERR 3 – Assessment of Special Status Plants	Section 8.8.8.1 – Potential Adverse Effects and Issues on Special Status Plants
Terrestrial Resources	Effects of continued Project operation on riparian and wetland habitat and associated wildlife, including waterfowl and wetland-dependent birds.	FERC SD1	TERR 1 – Assessment of Bishop Creek Riparian Community Study TERR 4 – General Wildlife Study	Section 8.7.5 – Potential Adverse Effects and Issues Regarding Waterfowl and Wetland-Dependent Birds
Terrestrial Resources	Effects of continued Project construction, O&M on upland wildlife habitat and associated wildlife.	FERC and TWG/SCE	TERR 4 – General Wildlife Study	Section 8.6.4 – Potential Adverse Effects and Issues Regarding Wildlife Resources
Terrestrial Resources	Effects of continued O&M of the Project transmission lines on migratory birds and raptors.	FERC SD1	TERR 4 – General Wildlife Study	Section 8.6.4 – Potential Adverse Effects and Issues Regarding Wildlife Resources
Terrestrial Resources	Indirect effects (i.e., recreational activities related to the Project) of Project O&M on species (mule deer).	FERC SD1	TERR 4 – General Wildlife Study	Section 8.8.8 – Potential Adverse Effects and Issues Regarding Endangered Species
Threatened and Endangered Species	Effects of Project O&M on federally endangered species (Sierra Nevada yellow-legged frog; Sierra Nevada bighorn sheep; southern willow flycatcher, southern mountain	FERC SD1	TERR 4 – General Wildlife Study	Section 8.8.8 – Potential Adverse Effects and Issues Regarding Endangered Species

Resource Area	Potential Issue	TWG or FERC Identified Issue	Study Plan Title	Location in this DLA
	yellow-legged frog) and designated critical habitat (Sierra Nevada yellow-legged frog and Sierra Nevada bighorn sheep).			
Threatened and Endangered Species	Effects of continued project operation on the federally listed endangered Owens tui chub.	FERC SD1	AQ 1 – Instream Flow Needs Assessment Study Plan AQ 3 – Bishop Creek Fish Distribution Baseline Study	Section 8.5.5.5 - Potential Impacts of Continued Project Operation on the Federally Listed Endangered Owens tui chub
Recreation Resources	Effects of continued Project operation on recreational use in the Project area, including the adequacy of existing recreational access and capacity of existing recreational facilities.	SCE/TWG and FERC SD1	REC 2 – Recreation Facilities Condition and Public Accessibility Study	Section 8.9.7 1 – Potential Adverse Effects and Issues – Recreation Facilities and Public Accessibility
Recreation Resources	Evaluate current recreational use and future recreation needs for the Project.	SCE/TWG	REC 1 – Recreation Use and Needs Study Plan	Section 8.9.7 2 – Evaluation of Current Recreational Use and Future Recreation Needs for the Project
Land Use and Aesthetic Resources	Accuracy of the current Project boundary, and whether lands should be added to or removed from the Project boundary.	FERC SD1	LAND 1 – Project Boundary and Lands Study	Section 8.9.7.3 – Evaluation of the Accuracy of the Current Project Boundary
Tribal Resources	Ethnographic and tribal background research and Native American Traditional Cultural Properties (TCP)	SCE/TWG	CUL 2 – Tribal Resources Study*	Section 8.13 – Tribal Resources
Cultural and Tribal Resources	Effects of continued Project operation on archaeological or built environment resources, traditional cultural properties or archaeological resources that have associated tribal values that may be eligible for inclusion in the NRHP.	FERC SD1	CUL 1 – Cultural Resources Study*	Section 8.11 – Cultural Resources
Developmental Resources	Economics of the Project and the effects of any recommended environmental measures on the Project's economics.	FERC SD1	No study	To be included in the FLA

* These technical reports are still in progress and under review by stakeholders. Final effects analysis will be included in the FLA.

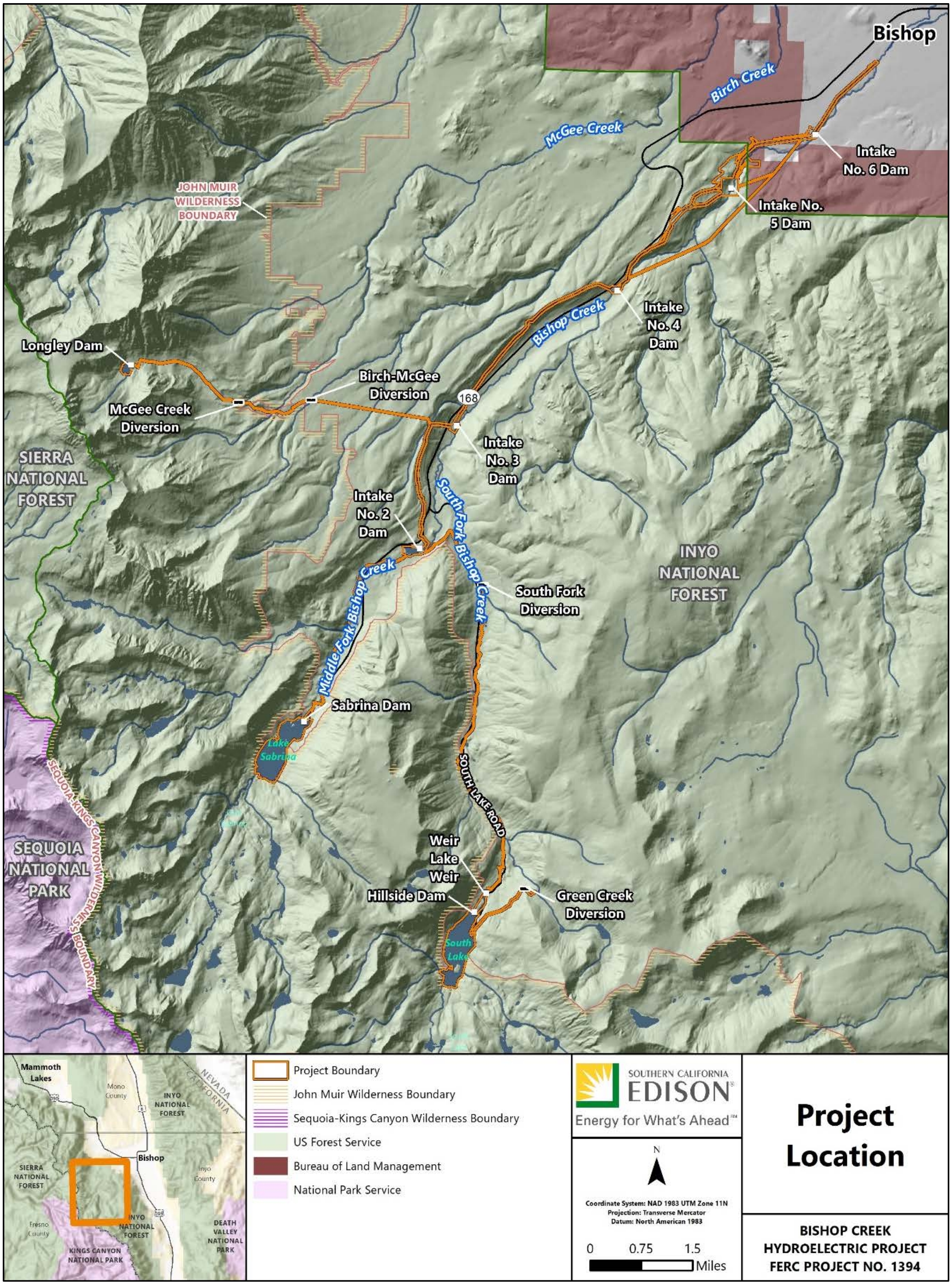

Figure 8.1-1. Location of Bishop Creek Project.

8.2 GENERAL DESCRIPTION OF THE RIVER BASIN

The Bishop Creek is located in the 2,600-square-mile watershed of the Owens River. The Owens River is 183-miles-long and flows southeasterly between the eastern Sierra Nevada and the Inyo and White mountains, moving through Lake Crowley reservoir and descending through the Owens River Gorge, emerging at the north end of the Owens Valley, and terminating at Owens Lake south of the city of Lone Pine, California.

The confluence of Bishop Creek and the Owens River is east of the City of Bishop, California. Approximately 25 miles southeast of the City of Bishop, what remains of the Owens River is diverted into the Los Angeles Aqueduct, which consists of three source aqueducts from the Owens River, Haiwee reservoir, and the Mono extension. The Los Angeles Aqueduct was constructed in 1913 and is managed and maintained by the LADWP. The aqueduct system delivers water from the Owens River to the city of Los Angeles, California, per the long-term water agreement between the LADWP and Inyo County. Inyo County, LADWP, and others have been implementing the Lower Owens River Plan since the early 2000s. This plan provides for re-watering a 62-mile-long stretch of river and adjacent floodplain left essentially dry after the river was diverted into the Los Angeles aqueduct in 1913 (IC 2021). The largest incorporated city in the Owens River Valley is Bishop. The census-designated-places (CDPs) of Big Pine, Independence, and Lone Pine are located downstream from Bishop.

The Bishop Creek Basin is a sub-basin of the Owens River (Figure 8.2-1). Bishop Creek is composed of three forks: North, Middle and South. The North Fork of Bishop Creek is unimpaired and flows into North Lake, while the Middle Fork flows into Lake Sabrina. The two forks then join southeast of the community of Aspendell, California. South Fork Bishop Creek flows through South Lake and continues north, where it combines with the North and Middle forks approximately 2.5 miles northeast of Aspendell. Bishop Creek continues in a northeasterly direction before continuing into the Owens Valley, flowing through the City of Bishop before its confluence with the Owens River east of Bishop.

The mainstem of Bishop Creek is a 10.1-mile-long stream in the eastern Sierra Nevada spanning across two of Inyo County's 13 watersheds (USEPA 2018) and is the largest tributary of the Owens River. Bishop Creek drains a 104-square-mile area which is largely dammed for the purposes of water storage and power generation. The largest dams on Bishop Creek are owned and operated by SCE and make up the Bishop Creek Project: Lake Sabrina, South Lake, and Longley Lake Dam (Figure 8.2-1).

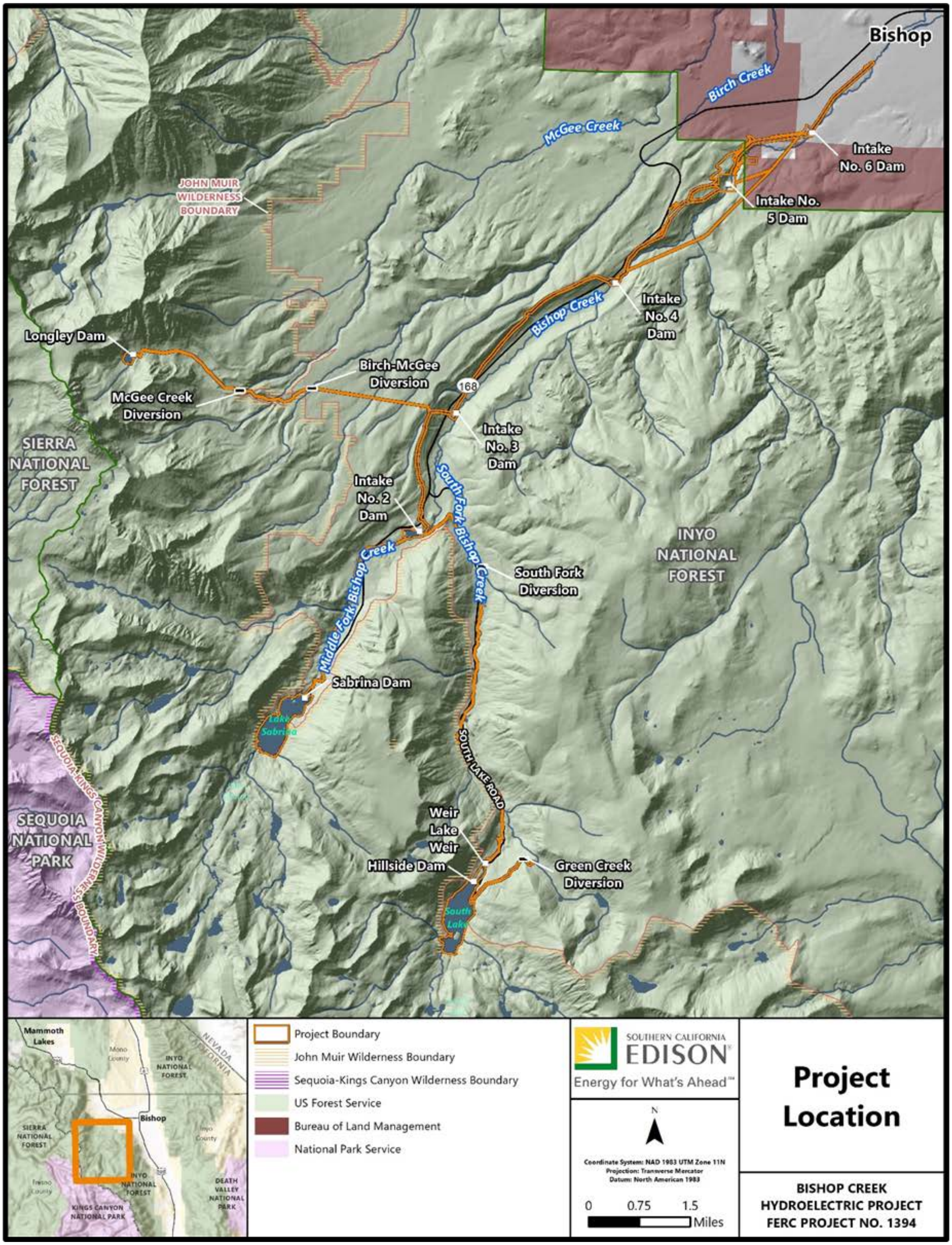

Figure 8.2-1. Bishop Creek Drainage Area.

8.2.1 TRIBUTARIES

Tributary streams provide approximately 50 percent of the surface water inflow to the Owens Valley (USGS 1998). Bishop Creek is the largest tributary to the Owens River. Other tributaries to the Owens River include Spring Valley Wash, Silver Canyon Creek, Coldwater Canyon Creek, Hot Creek, Rock Creek, Big Pine Creek, Birch Creek, Independence Creek and Lone Pine Creek. (Figure 8.2-2).

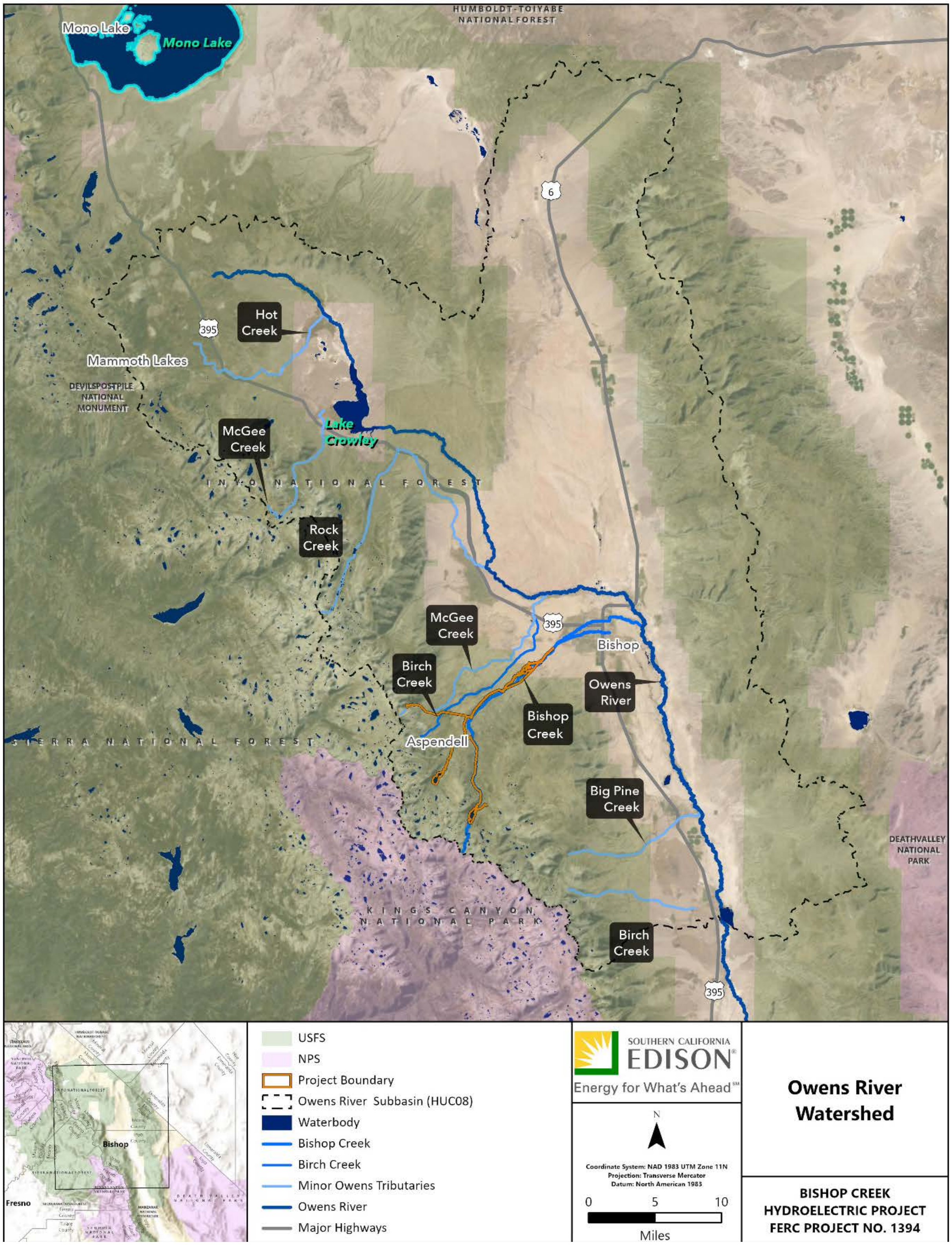

Figure 8.2-2. Owens River Watershed and Major Tributaries to the Owens River.

8.2.1.1 Other Diversion Structures

There are eight dams (Hillside, Sabrina, Longley, Intake No. 2, Intake No. 3, Intake No. 4, Intake No. 5 and Intake No. 6) and four diversions (Green Creek, Birch-McGee diversion pipe, Birch Creek, and McGee Creek) on Bishop Creek. A description of each is provided in Exhibit A (Volume 1). Several hydropower projects have been developed on the Owens River and its other tributaries. According to the National Inventory of Dams, aside from the Bishop Creek Project, there are four other dams on the Owens River and its tributaries in Inyo County (USACE 2021).

Many of the natural channels of tributary streams have been modified for operation of the river-aqueduct system. Diversion structures were installed in most streams, and the natural channels of some streams have been straightened. In the Bishop Creek Basin, much of the tributary streamflow that reaches the valley floor is diverted to canals that distribute water for agricultural uses, wildlife habitat, or ground water recharge. Excess water is returned to the canals and eventually to the Owens River (USGS 1998).

8.2.2 Major Land and Water Uses

8.2.2.1 California Water Right Law

The water laws in most Western states follow the doctrine of prior appropriation, while most Eastern states adhere to the riparian doctrine. The riparian doctrine grew out of English Common Law. Owners of land on which water abuts or flows through their property were granted water rights, with such rights subject to “reasonable use”. Appropriative water rights developed from early mining laws require diverted water to be used for a beneficial purpose on the land associated with that right.

California utilizes a dual riparian-appropriative system due to seasonal, geographic, and quantitative differences in precipitation throughout the state. Article X, Section 2 of the California Constitution requires that all water use, whether the right is riparian or appropriative in nature, be “reasonable and beneficial”. Additionally, California has two other types of water rights: reserved (water set aside by the federal government when it reserves land for public domain), and pueblo rights (a municipal water right based in Spanish and Mexican law). Riparian rights have a higher priority than appropriative rights. (California Water Board 2020).

The 1943 California Water Code established the foundation for the acquisition and protection of water rights (Inyo County 2014). The California SWRCB manages and administers various federal and state water quality programs. Locally, the Lahontan Regional Water Quality Control Board (RWQCB) is responsible for oversight in the Owens Valley. The Inyo County General Plan Land Use Elements contains the provisions related to both land use, public services, and utilities. Inyo County and LADWP have a cooperative long-term water resources management agreement (1991) to ensure that there is a reliable water supply for export to Los Angeles, and for use in Inyo County (Inyo County 2017).

8.2.2.2 Owens River Land and Water Uses

The Owens River forms a 2600-square-mile watershed, of which the Bishop Creek is the largest tributary. The confluence of Bishop Creek and the Owens River is east of Bishop, California. Ten miles southeast of Big Pine, what remains of the Owens River is diverted into the Los Angeles Aqueduct, which consists of three source aqueducts from the Owens River, Haiwee reservoir, and the Mono extension. The Los Angeles Aqueduct was constructed in 1913 and is managed and maintained by the LADWP. The aqueduct system delivers water from the Owens River to the city of Los Angeles, California.

Much of the land in the Owens Valley drainage basin is either owned by the United States government or the LADWP (307,000 acres). A small portion is owned by private citizens and municipalities. Of the United States government-owned land in the area, the two agencies that own the land generally located in the mountains and along the edges of the mountains are the USFS and the BLM (USGS 1998).

The primary economic activities in the valley are livestock, ranching and tourism. Approximately 190,000 acres of the valley floor is leased by the LADWP to ranchers for grazing, and 12,400 acres are leased for pasture for growing alfalfa. Most of the land in the area is open to the public and is used for hunting, fishing, skiing, and camping (USGS 1998).

The major historical periods of water use are summarized in Table 8.2-1.

Table 8.2-1. Major Historical Periods of Water Use

Period	Characteristics of Water Use
Pre-1913	Prior to the first export of water from the Owens Valley. Installation of canals to dewater the valley floor and supply water for farming and ranching.
1913 to 1969	Export of surface water from the Owens Valley by diversion of the Owens River and tributary streams into the Los Angeles Aqueduct. General decrease of farming and ranching in the valley. Brief periods of pumping to augment local surface-water supplies.
1970 to 1984	Export of some of the additional surface water. Beginning export of ground water with the addition of new wells and second aqueduct. Major fish hatcheries switch supply from surface water to ground water. Decrease in consumptive use of water by remaining ranches.
1985 to 1988	Continued export of surface and ground water. Design of cooperative water-management plan between Inyo County and the LADWP. Installation and initial operation of enhancement and mitigation wells.

8.2.2.3 Bishop Creek Land and Water Uses

On January 1, 1974, SCE had nine claimed Supplement Statements of Water Diversion and Use rights in Inyo County and six appropriative licensed water rights that began in 1918 according to eWRIMS. SCE’s water rights are outlined in Section 8.4.5.1.

Land ownership within and adjacent to the Bishop Creek Project boundary is predominantly composed of federal lands jointly administered by the INF and BLM; a small portion of INF lands within the Project boundary are managed as a National Wilderness Area (John Muir Wilderness). The remainder of lands are owned by SCE, LADWP or private landowners, much of which is classified as rurally protected lands. While there is only a small portion of residential lands adjacent to the Bishop Creek Project boundary, the INF provides many recreation opportunities in the area that attracts visitors. The Bishop Creek Project boundary includes only lands necessary for Project O&M and for the conveyance of water throughout the Bishop Creek system.

8.2.2.4 Other Diversion Structures

There are eight dams (Hillside, Sabrina, Longley, Intake No. 2, Intake No. 3, Intake No. 4, Intake No. 5, and Intake No. 6) and four diversions (Green Creek, Birch-McGee diversion pipe, Birch Creek West and McGee Creek) on Bishop Creek. A description of each is provided in Section 5.2.3.

8.2.3 Climate

Most of the water supply for the state of California comes from snowmelt in the Sierra Nevada mountain range; therefore, climate change and how it affects precipitation is of importance to the region. As the temperatures in the Sierra Nevada increase, snowmelt increases as does precipitation, resulting in earlier snowmelt which increases the risk of flooding in the spring and water shortages in the summer (USFS 2009).

The climate in the Sierra Nevada is largely influenced by the Mediterranean climate that is similar in the rest of the state of California. The Mediterranean climate is marked by rainy winters, and dry and warm to hot summers. Between elevation 5000 and 8000 feet, precipitation is the highest, although the eastern range receives 25 inches or less of precipitation per year. Summer highs average between 42 degrees Fahrenheit (°F) and 90°F.

With the snowpack being a major source of water and therefore electric power in California, there were several reservoirs constructed in the canyons of the Sierra Nevada throughout the twentieth century. Despite this, the Sierra Nevada still casts a large rain shadow that makes it largely responsible for the state of Nevada being the driest state in the United States (NOAA n.d).

8.2.4 Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality (CEQ) regulations for implementing National Environmental Policy Act (NEPA) (40 CFR §1508.7), a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on information in the PAD, FERC's preliminary analysis identified water quantity and water quality as resources that could be cumulatively affected by the proposed continued O&M of the Bishop Creek Project in combination with other hydroelectric and water storage projects in the Owens River Basin.

The geographic scope of FERC's cumulative effects analysis was defined by the physical limits or boundaries of (1) the Proposed Action's effect on resources, and (2) contributing effects from other hydropower and non-hydropower activities within the Bishop Creek Basin. FERC identified the geographic scope for water quantity to include the Bishop Creek Basin from its headwaters in the eastern Sierra Nevada, including the North, Middle, and South Forks through the City of Bishop, California, to its confluence with the Owens River. FERC chose this geographic scope because the O&M of the Bishop Creek Project, in combination with other hydroelectric and water storage projects in the Bishop Creek Basin may affect flow and water quantity in the Owens River.

Temporally, the scope of FERC's cumulative effects analysis in the Environmental Assessment will include a discussion of past, present, and reasonably foreseeable future actions and their effects on each resource that could be cumulatively affected. Based on the potential term of a new license, the temporal scope will look 30 to 50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion will, by necessity, be limited to the amount of available information for each resource. The quality and quantity of information, however, diminishes as analysis moves further away in time from the present.

8.2.5 References

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8.3 GEOLOGY AND SOILS

This section describes geology and soil resources that have the potential to occur in the Bishop Creek Project area. The discussion presented here is intended to provide background for evaluating potential issues as summarized in the TSP and FERC's SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of the Bishop Creek Project effects. For purposes of this document, the Project area is defined as the FERC Project boundary.

The Project is located in the Cascade-Sierra Physiographic Province (Figure 8.3-1). The area is characterized by large topographic relief with relative elevations ranging from over 13,000-feet above msl to slightly over 4,00- feet above msl at Powerhouse No. 6. Most of the underlying bedrock is composed of Mesozoic granitic type rock that has been subjected to mechanical weathering by water and ice but is largely unaffected by chemical alteration. Mechanical weathering and volcanic events have resulted in a limited variety of surficial deposits. The general lithology of the Project area is described in Figure 8.3-2.

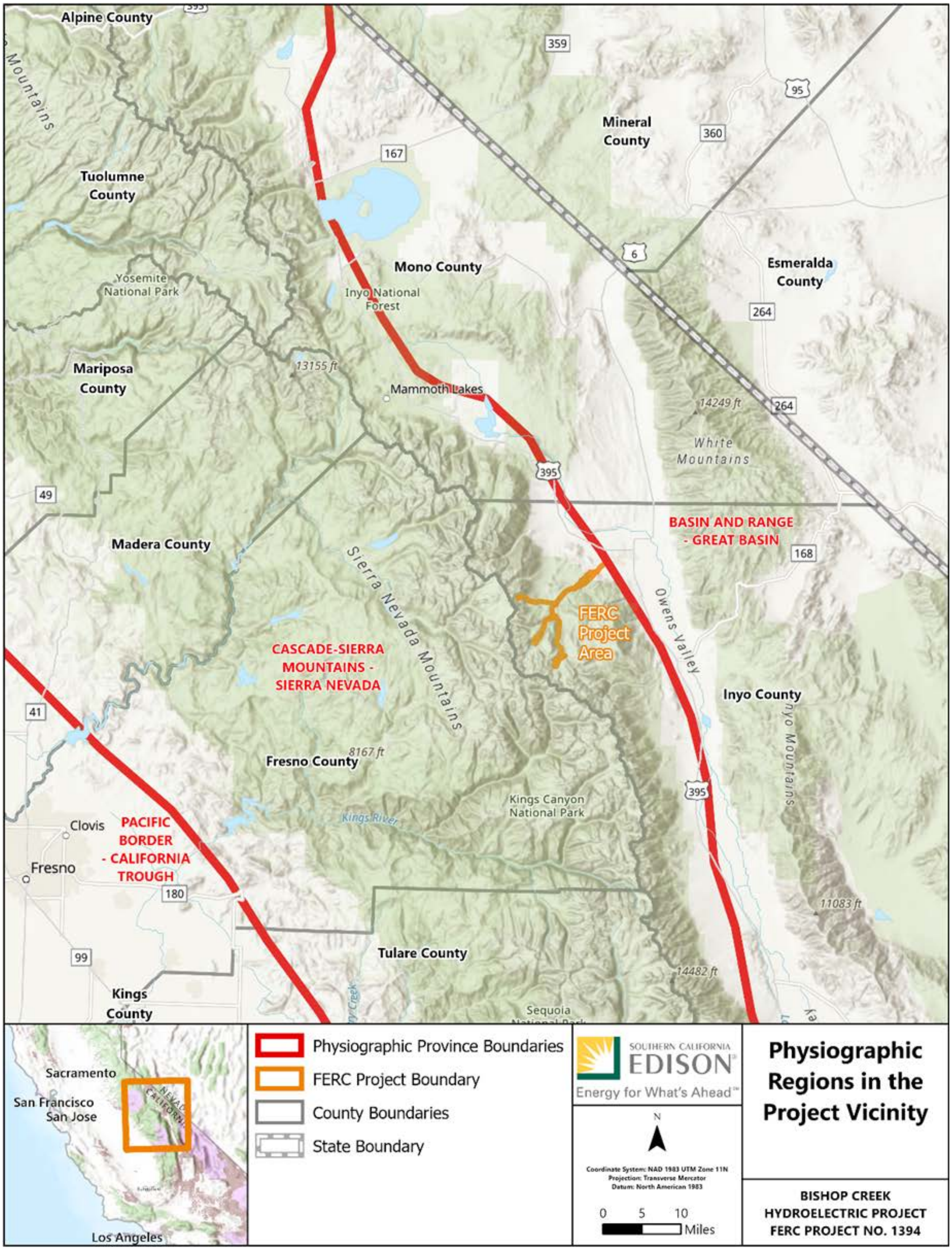
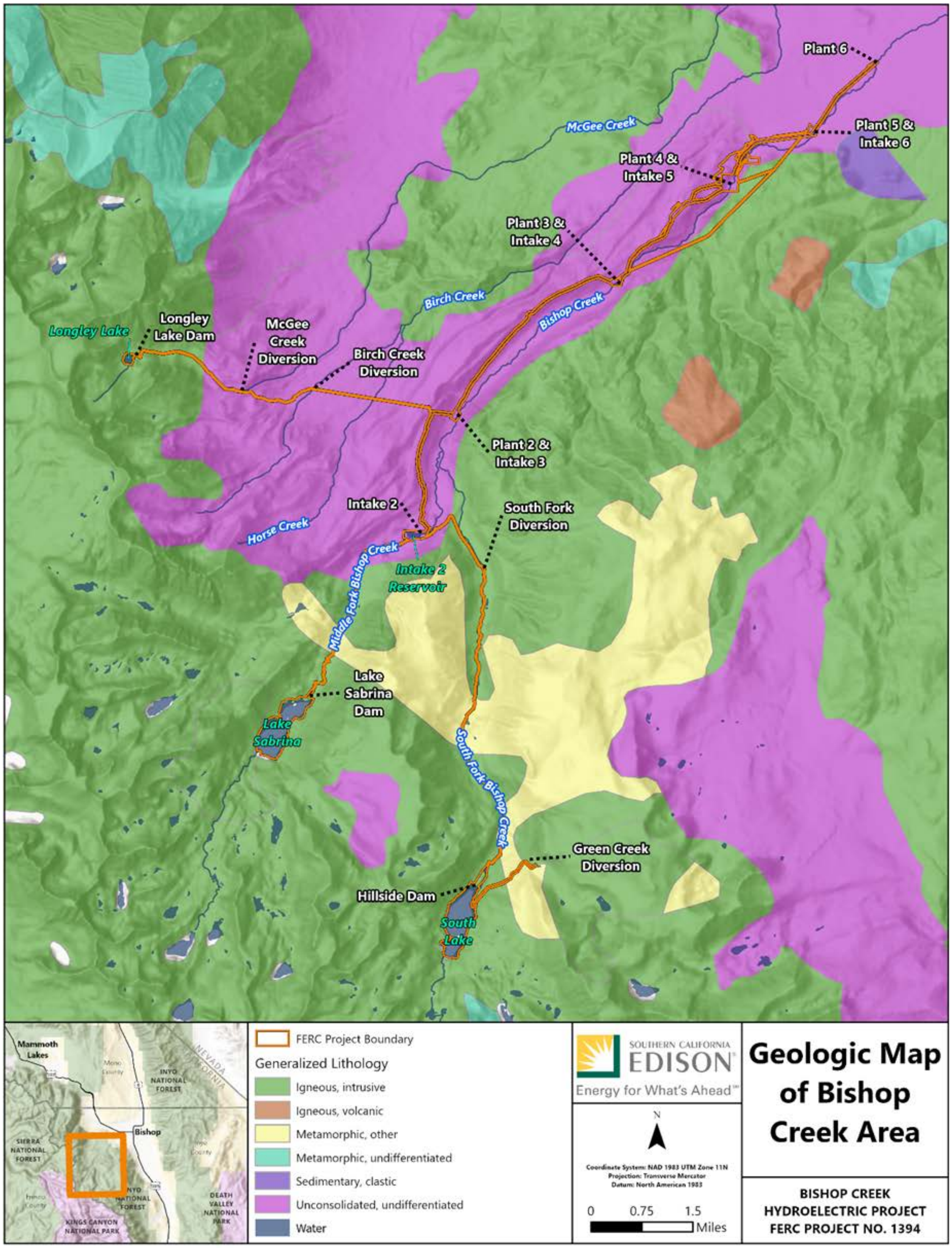


Figure 8.3-1. Physiographic Regions in the Project Vicinity.



Source: USGS SGMC

Figure 8.3-2. Geologic Map of the Project Area

8.3.1 Bedrock Geology and Physiography

The oldest exposed rocks in the area are metamorphosed remnants of miogeosynclinal sediments. These sediments, typically sandstones, siltstones, shales and carbonates, were deposited along a shallow marine shelf which extended over much of the western United States during the Paleozoic. Beginning in the Mesozoic, a period of volcanism occurred over marine sedimentation. This volcanism is indicated by thick volcanic deposits overlying the older sequence. Although these later rocks are not preserved in the upper Bishop Creek drainage, the event is important to the area's geology. Regional deformation likely occurred contemporaneously with the volcanism, and the Paleozoic rocks were folded, faulted and further metamorphosed through this process (ESE 1974).

By the Early Cretaceous, regional deformation had ceased and the Sierra Nevada batholith was developing. The batholith itself is composed of several discrete intrusive episodes, which are either in sharp contact with one another or are separated by remnant metamorphic rocks. In general, the older intrusive bodies are dark, mostly mafic rocks classified as gabbro, diorite or quartz diorite. Succeeding younger plutons were emplaced ranging in composition from granodiorite, through quartz monzonite to alaskite (ESE 1974).

The batholith was mostly established by forcible intrusion, in which older rocks were displaced by and sometimes incorporated into the intruding body. After emplacement of the batholith, metalliferous solutions that were expelled by the cooling plutons reacted with the surrounding metamorphic rocks to form contact ore bodies (ESE 1974).

By the late Cretaceous and extending into mid-Tertiary period, a broad upwarp occurred. This process tilted the Sierra Nevada batholith to the west, forming a low relief topographic arch over the present-day Owens Valley. Subsequent block faulting has raised the Sierra Valley escarpment throughout the Pleistocene and into recent times. Volcanism associated with this structural change is evidenced by cinder cones, remnant lava flows, and volcanic necks throughout the region. The area's topography was further modified by a series of glacial events, during which time vast ice fields extended from the ridge crest down through the major canyons, leaving U-shaped canyons, moraines, and other classic glacial erosional features. The most recent moraines are still identifiable, suggesting that Holocene erosion has been a minor factor since the last glaciation (ESE 1974).

Remnant metasedimentary rocks make up one of the more conspicuous geological features of the Project area. Specifically, these rocks make up the largest mass is the Bishop Creek pendant, located east of the Middle Fork of Bishop Creek. This roof pendant is trapped between two intrusive bodies of different ages. This feature is most evident in the thin septum that extends across the Middle Fork and alongside North Lake. Another thin unit, extending southeast from a younger metasedimentary sequence on Mount Humphreys, crosses over into the Bishop Creek Project area at Mount Emerson and thins at the North Fork of Bishop Creek (ESE 1974).

An older unit consists of the siliceous calcic hornfels, as well as marble of the Middle Fork septum and bleached marble of Mount Emerson. These rocks were derived from a wide array of carbonate-rich sediments. The Middle Fork hornfels are commonly light to yellowish grey, and very hard. Mineral content generally consists of a fine-grained quartz groundmass enclosing larger calcic-silicate minerals such as diopside or tremolite. The unit grades to marble in the lower Middle Fork section and is predominantly marble on Mount Emerson (ESE 1974). The marbles are generally light to medium grey, bleached white near igneous contacts. Mineral content is mostly calcite, with the more impure rocks containing quartz and various calcic-silicates. Near magmatic contacts are zones consisting mainly of garnet, pyroxene, or epidote, which, when scheelite is present locally, have created in some instances historically commercial tungsten ore deposits (ESE 1974).

A younger unit consists of coarse-grained micaceous quartzite grading to finer grained pelitic hornfels. This unit is easily identified due to the characteristic red-brown iron oxide staining of both rock masses. Derivation of such rocks was from aluminum rich shales and siltstones. Mineral contents vary, but a typical hornfel would contain feldspar and biotite, increasing in quartz content to a quartzite. Accessory minerals of both units are commonly apatite, magnetite, pyrite and sphene (ESE 1974).

The predominant igneous rock of the area is the Lamarck granodiorite. This rock was forcibly emplaced approximately 100 million years ago. Tungsten Hills quartz monzonite was later intruded alongside the granodiorite, usually separated by remnant metamorphic rocks or mixed granitic zones. This composite batholith accounts for most of the exposed bedrock in the Project area (ESE 1974).

The older hornblende gabbro and quartz diorite rocks, though mapped as one unit, probably represent remnants of different plutons. Hornblende gabbro is generally a medium grained, dark rock consisting of calcic plagioclase as the principal feldspar, hornblende as the principle mafic mineral, and a small percentage of quartz. Quartz diorite is a lighter rock, with slightly more sodic plagioclase, roughly equal amounts of biotite and hornblende, and some quartz. These rocks are apparent throughout the Project area as dark blotches enclosed by the younger, lighter intrusive rock (ESE 1974).

The Lamarck granodiorite is most visible around Lake Sabrina as a light grey, commonly foliated, massive rock. Generally, it is medium grained, consisting of sodium rich plagioclase, approximately equal amounts of potassium feldspar and quartz, and evenly distributed hornblende and biotite (ESE 1974).

The Tungsten Hills quartz monzonite has been altered to an albite facies over much of the Project area, visible as a light brown-orange rock. This alteration occurred adjacent to the metamorphic rock. The rock ranges in composition from nearly equal amounts of quartz and feldspars to a predominance of sodic plagioclase. Mafic rocks comprise very little of the total composition. The albitized facies grades away from the contact into a quartz monzonite. This rock is typically medium grained, consisting of roughly equal amounts of quartz, potassium feldspar and sodic plagioclase, with some biotite (ESE 1974).

Broad upwarping during the late Cenozoic is locally responsible for much of the present topography. The Project area is located on the northern flank of the Coyote warp. This region was once eroded to grade. Increased uplift renewed deep dissection by streams such as Bishop Creek. It was during this period that Pleistocene glaciation reached its peak, and the valleys of the North Fork, Middle Fork, and South Fork were carved. This glacial activity resulted in extensive deposits of glacial till piled up along Bishop Creek, especially along the lower reaches downstream of Powerhouse 4. Although mapped as one unit, these tills represent at least four advances, with each moraine stacked against the preceding one. Isolated patches of olivine basalt around North Lake and basalt boulders in older till testify to the fact that volcanism was at least contemporaneous with early uplift (ESE 1974).

The Sierra Nevada frontal fault zone forms the eastern escarpment of the Sierra Nevada, extending approximately 373 miles from north of the Garlock fault (located at the southern end of the Sierra Nevada) to the Cascade Range (in Oregon), and juxtaposes extensive Quaternary alluvial fan, glacial, and rockslide deposits in the hanging wall upon bedrock in the footwall. The character of the eastern escarpment of the Sierra Nevada frontal fault zone varies, from wide zones of en echelon escarpments to narrow zones characterized by a single escarpment. South of Bishop, the eastern margin of the Sierra Nevada is defined by a continuous north northwest-striking escarpment (Le et al. 2007).

The Owens Valley Fault, one of the nearest (varies from 3 to 14 miles) active faults to the Project area, has generated earthquakes of a magnitude of 8.0 and greater. The fault passes through Lone Pine near the eastern base of the Alabama Hills and follows the floor of the Owens Valley northward to the Poverty Hills, where it steps 1.8 miles to the west and continues northward across Crater Mountain and through the Bishop area (Le et al. 2007).

The Round Valley fault, a high-angle, down-to-east normal fault along the prominent eastern front of central Sierra Nevada is in one of the most seismically active regions along the eastern front of the Sierra Nevada. A moderate earthquake (magnitude 5.8) occurred approximately 15 miles north of the Project area on November 23, 1984 along a portion of this fault (Priestley et al. 1988).

A regional system of jointing in the granitic rocks forms an important aspect of the area’s hydrology. These joints are in conjugate sets, striking northwest and northeast, and dipping steeply. The joints cross intrusive contacts uninterrupted, indicating that the formation of the joints came after emplacement of the batholith. Both surface and subsurface water movement is strongly influenced by this system. Notable examples of water movement include the northeast trending chasm through which Loch Leven empties, and the well-developed joints northeast of North Lake (ESE 1974).

8.3.2 Glacial Features

As previously noted, the last major erosion activity that occurred in the area was due to glacial impacts. In most places, the divide is a "knife-edged" ridge, passable on foot in only a few places. The upper slopes are largely comprised of steep-walled glacial cirques that are mantled with talus. Moraines fringe the lower sides of the cirque basins and extend downward to altitudes as low as 5200 feet in the larger canyons (ESE 1974).

The most complete representation of glacial deposits in the Project area is located along Bishop Creek. The degree of dissection and the throws along the faults suggest that glacial deposits are younger to the southeast. Each successive glacier was southeast of its predecessor, and all the morainal ridges on the northwest side of Bishop Creek are lateral moraines that were deposited along the northwest sides of these glaciers (Bateman 1965).

8.3.3 Mineral Features

The contact metasomatic, scheelite bearing tungsten deposits contain the principal ores of the Bishop district. At the end of 1953, Bateman (1965) reported that the mines in the Bishop district, which includes Bishop Creek, produced approximately 1.3 million short-ton units of tungsten trioxide (WO3). While most of these deposits are located outside the Bishop Creek watershed, the south fork of Bishop Creek contains many metamorphic inclusions and are the only ones in which notable amounts of scheelite-bearing tactite has been found.

The Schober mine was located on the east side of the South Fork of Bishop Creek. The deposit was discovered in late 1940 and placed in operation from 1942 to 1943. In 1943, the ore body was exhausted and, after exploration failed to reveal additional ore, the mine was closed. In addition, several prospects were noted in the Coyote Creek drainage and the South Fork.

Gold was also mined from the Cardinal Mine, located approximately 1 mile south of Lake Sabrina at an elevation of 8,700 feet. The mine was operated from 1911 to 1922 and 1934 to 1938. The amount of gold, silver and copper mined was not reported. The mine opening collapsed, and no activity has occurred since 1938 (Bateman 1965).

8.3.4 Soils

The INF, where most of the Bishop Creek Project is located, contains areas of shallow soils. Shallow soils are defined as soils less than 20 inches deep (USDA 2013) and are sensitive because they are susceptible to erosion. These soils are generally weakly developed, with relatively little organic matter, and therefore have low nutrient levels. Any soil displacement or loss can affect their productivity. When soil is shallow, runoff can infiltrate to the bedrock layer and run along that layer, carrying the overlying shallow soil with it. These soils are most common in steeper areas, high elevation areas, and areas of recent geologic deposition, such as volcanic deposits. Forest coverage illustrates that shallow soils are most common in rocky areas of the forest, and throughout the White and Inyo Mountains (USDA 2013).

Most soils in the Bishop Creek Project area are characterized by multiple types with varying characteristics. Table 8.3-1 and Table 8.3-2 present summaries of the physical characteristics of the typical soils underlying the Bishop Creek Project area. Appendix B (Volume 2) presents the various mapped soil units in the Bishop Creek Project area.

Most soils underlying the Bishop Creek Project area are comprised of sand, as indicated by the majority of the soil containing greater than 80 percent sand by weight. Silt size particles generally comprise between 10 percent and 20 percent of the soil by weight and clay size particles generally make up less than 9 percent of the soil by weight. Most Project area soils have approximately 20-40 percent of their volume as rock fragments between 0.07 inches and 9.8 inches in size. In some instances, rock fragments exceeding 23 inches in size have been documented in the soil, particularly in the Goodale complex.

The USFS (a division of the U.S. Department of Agriculture [USDA]) (USFS 1995b) divided the soil types that occur in the general area of the Project into various regimes. Of the four regimes identified for the INF, three were located beneath or immediately adjacent to the Project facilities. Those three soil regimes are described below.

Table 8.3-1. Soil Types and Characteristics Beneath and Adjacent to the Project Facilities

Map Symbol (a)	Name	Slope (%)	Available Water Cap. (inches)	Permeability (in/hr)	Max. Erosion Hazard	Erosion Factor (K) (b)	Soil Productivity
105	Typic Cryorthents	0-35	NR (c)	Mod. (d) High (NR)	Mod.-High	0.24	NR
107	Typic Cryorthents	50-85	NR	Mod. High (NR)	Very High	0.24	NR
111	Typic Cryorthents-Typic Cryochrepts-Rock Outcrop Complex	0-45	NR	Mod. High-High (NR)	Mod.-High	0.24-0.37	NR
117	Rock Outcrop - Rubbleland Complex	20-60	NA (e)	NA	NA	NA	NA
125	Bairs-Kilburn Family	8-30	Moderate	Rapid (6-20)	Mod.-High	0.10	NR
129	Berent-Glenbrook-NanamkinFamilies	30-50	NR	Rapid (6-20)	NR	0.15	NR
147	Rock Outcrop – Typic Cryorthents Complex	0-45	NR	Mod. High (NR)	Mod.-High	0.24	NR
148	Rock Outcrop-Typic Cryorthents Complex	40-85	NR	Mod. High (NR)	Very High	NR	NR
152	Cartago Gravelly Loamy Coarse Land	5-30	NR	NR	NR	0.15	NR
154	Cartago Gravelly Loamy Sand	0-2	NR	NR	NR	0.24	NR
170	Conway-Conway Cobbly-Chesaw Family	0-15	Low-Mod.	Mod. Rapid (NR)	Slight	0.15	Low-Mod.
196	Goodale Loamy Coarse Sand	5-15	Very Low	Rapid (NR)	Slight	0.15	NR
199	Goodale-Cartago Complex	2-5	Very Low	Rapid (NR)	Slight	0.02-0.15	NR
200	Goodale-Cartago Complex	5-15	Very Low	Rapid (NR)	Slight	0.10-0.15	NR
201	Goodale-Cartago Complex	2-5	Very Low	Rapid (NR)	Slight	0.02-0.15	NR
222	Inyo Sand	9-15	Very Low	Rapid (NR)	Moderate	0.17	NR
226	Kilburn Family-Watterson Association	4-15	Very Low	Mod. Rapid (NR)	Moderate	0.05-0.15	NR
227	Kilburn Family-Watterson Wet Association	4-30	Very Low to Low	Mod. Rapid (NR)	Moderate	0.05-0.15	NR
231 /.232	Lithic Torriorthents-Lithic Haplargids-Rock Outcrop Complex	30-75	Very Low	Rapid (NR)	Severe to Very Severe	0.10-0.24	NR
244	Lubkin-Tinemaha Complex,	5-15	Very Low to Low	Mod. Rapid (NR)	Moderate	0.10-0.15	NR
247	Lucerne Gravelly Loamy Sand	2-5	Low	Mod. Rapid (NR)	Moderate	0.10-0.15	NR
313	Wrango - Atter Families	60-90	Very Low	Rapid (6-20)	High to VeryHigh	0.10-0.15	Low-Mod.

Map Symbol (a)	Name	Slope (%)	Available Water Cap. (inches)	Permeability (in/hr)	Max. Erosion Hazard	Erosion Factor (K) (b)	Soil Productivity
320	Waterman - Sur Families	30-60	Very Low	Rapid (6-20)	Mod. to High	0.05-0.10	Very Low
330	Wrango Family	30-60	Very Low	Rapid (6-20)	Mod. to High	0.15-0.22	Low-Mod.
340	Ulymeyer-Rovana Complex	5-15	Very Low	Rapid (NR)	Slight	0.10-0.15	NR
347	Nanamkin Family	15-60	Very Low	Rapid (6-20)	Low-High	0.05	Low
355	Kilburn - Nanamkin Families	5-15	Low	Mod. Rapid (2-6)	Low	0.15	Low-Mod.
359	Rock outcrop - Powment Family	30-60	Very Low	Rapid (6-20)	Mod.-High	0.10	Low
361	Wrango - Berent Families	2-30	Very Low	Rapid (6-20)	Low-Mod.	0.15	Low
364	Preston Family, Rock Outcrop	30-60	Low	Rapid (6-20)	Mod.-High	0.22	Low-Mod.
366	Stecum Family	2-30	Very Low	Rapid (6-20)	Low-Mod.	0.10	Low
367	Stecum Family	30-60	Very Low	Rapid (6-20)	Mod.-High	0.10	Low
368	Bearskin - Mascamp Families	15-30	Very Low	Mod. Rapid (2-6)	Low-Mod.	0.17	Low-Mod.
369	Xeric Haplodurids	2-9	Very Low	Rapid (NR)	Slight	0.15	NR
370	Xerofluvents	0-5	Low to Mod.	Mod. Slow (NR)	Slight	0.05-0.17	NR
402	Bairs Family	15-50	Low	Mod. (0.6-2)	Low-High	0.10	Low-Mod.
406	Artray - Chesaw Families	0-5	Moderate	Mod. (0.6-2)	Low	0.24	Mod.-High
413	Wrango - Pizona Families	5-30	Very Low	Rapid (6-20)	Low-Mod.	0.15	Low-Mod.

Notes:

a – See Soil Unit Maps in Appendix B (Volume 2)
b – Does not apply to rock outcrops
c – NR=Not reported
d – Mod=Moderate
e – NA=Not Applicable

Table 8.3-2. Particle Size Distribution and Rock Fragment Percentage for Various Soil Types in the Project Area

Map Symbol (a)	Name	Slope (%)	Particle Size (%) by Weight [a,b]			Fragments >2MM (% by Volume of Total Soil)				
			Sand >0.05MM <2MM	Silt >0.002MM <0.05 MM	Clay <0.002 MM	Total Fragments	Fragments 2-74 MM	Fragments 75-249 MM	Fragments 250-599 MM	Fragments >=600 MM
105	Typic Cryorthents	0-35	65	29	6	44	30	12	0	2
107	Typic Cryorthents	50-85	-(c)	-	-	-	-	-	-	-
111	Typic Cryorthents-Typic Cryochrepts-Rock Outcrop Complex	0-45	-	-	-	-	-	-	-	-
117	Rock Outcrop - Rubbleland Complex	20-60	-	-	-	-	-	-	-	-
125	Bairs-Kilburn Family	8-30	84	8	8	26	19	7	0	0
129	Berent-Glenbrook-NanamkinFamilies	30-50	79	17	4	22	22	0	0	0
147	Rock Outcrop – Typic Cryorthents Complex	0-45	-	-	-	-	-	-	-	-
148	Rock Outcrop-Typic Cryorthents Complex	40-85	-	-	-	-	-	-	-	-
152	Cartago Gravelly Loamy Coarse Land	5-30	83	11	7	31	24	5	0	2
154	Cartago Gravelly Loamy Sand	0-2	79	16	5	30	28	2	0	-
170	Conway-Conway Cobbly-Chesaw Family	0-15	68	20	13	8	8	0	0	0
196	Goodale Loamy Coarse Sand	5-15	82	11	8	41	17	12	0	12
199	Goodale-Cartago Complex	2-5	84	9	8	40	36	2	0	2

Map Symbol (a)	Name	Slope (%)	Particle Size (%) by Weight [a,b]			Fragments >2MM (% by Volume of Total Soil)				
			Sand >0.05MM <2MM	Silt >0.002MM <0.05 MM	Clay <0.002 MM	Total Fragments	Fragments 2-74 MM	Fragments 75-249 MM	Fragments 250-599 MM	Fragments >=600 MM
200	Goodale-Cartago Complex	5-15	82	11	8	41	17	12	0	12
201	Goodale-Cartago Complex	2-5	84	9	8	40	36	2	0	2
222	Inyo Sand	9-15	79	17	4	19	15	2	0	2
226	Kilburn Family-Watterson Association	4-15	84	9	8	45	27	5	0	13
227	Kilburn Family-Watterson Wet Association	4-30	84	9	8	45	27	5	0	13
231, 232	Lithic Torriorthents-Lithic Haplargids-Rock Outcrop Complex	30-75	85	9	6	30	28	2	0	0
244	Lubkin-Tinemaha Complex,	5-15	84	9	8	32	22	5	0	5
247	Lucerne Gravelly Loamy Sand	2-5	85	9	6	30	28	2	0	0
313	Wrango - Atter Families	60-90	80	18	2	15	10	5	0	0
320	Waterman - Sur Families	30-60	79	17	5	20	15	0	3	2
330	Wrango Family	30-60	18	18	2	15	10	5	0	0
340	Ulymeyer-Rovana Complex	5-15	83	11	7	29	21	5	0	3
347	Nanamkin Family	15-60	79	17	4	42	26	6	5	5
355	Kilburn - Nanamkin Families	5-15	66	29	5	34	14	19	1	0
359	Rock outcrop - Powment Family	30-60	97	2	2	44	42	2	0	0

Map Symbol (a)	Name	Slope (%)	Particle Size (%) by Weight [a,b]			Fragments >2MM (% by Volume of Total Soil)				
			Sand >0.05MM <2MM	Silt >0.002MM <0.05 MM	Clay <0.002 MM	Total Fragments	Fragments 2-74 MM	Fragments 75-249 MM	Fragments 250-599 MM	Fragments >=600 MM
361	Wrango - Berent Families	2-30	80	18	2	15	10	5	0	0
364	Preston Family, Rock Outcrop	30-60	80	17	3	25	10	10	5	0
366	Stecum Family	2-30	79	17	4	39	9	30	0	0
367	Stecum Family	30-60	79	17	4	39	9	30	0	0
368	Bearskin - Mascamp Families	15-30	80	17	3	25	25	0	0	0
369	Xeric Haplodurids	2-9	82	10	8	22	22	0	0	0
370	Xerofluvents	0-5	67	20	13	31	27	2	0	2
402	Bairs Family	15-50	82	11	7	24	20	1	2	1
406	Artray - Chesaw Families	0-5	68	23	9	15	15	0	0	0
413	Wrango - Pizona Families	5-30	80	18	2	15	10	5	0	0

Notes:

a - Particle sizes are for the uppermost soil horizon.

b -Total percentage may not equal 100 percent due to clay values being an average for multiple samples. c - The "-" indicates data not available or not reported.

8.3.4.1 Mesic Soil Temperature Regime Soils

In the Mesic soil temperature regime, the mean annual soil temperature is 47°F to 59°F. The soils in this group are widely distributed throughout the survey area. The soils in this group are found in material that weathered from granitic, basalt, metamorphic rocks, pumice and tuff. The elevation ranges from 4300 feet to 9600 feet. The soils are found on mountainsides, hillsides, valley bottoms, lake terraces, fan terraces, moraines, ridges and colluvial slopes; slopes range from 0 percent to 90 percent. Annual precipitation ranges from 4 inches to 30 inches. The soils in this group are shallow to very deep and are well to excessively drained.

WRANGO-BERENT-WATERMAN FAMILIES—ROCK OUTCROP

The soils in this map unit formed in material that weathered from granitic rock. These soils are found on mountainsides, hillsides, lake terraces, moraines, ridges and colluvial slopes of slopes of 0 to 90 percent.

8.3.4.2 Frigid Soil Temperature Regime Soils

The soils in this group formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, ash and tuff. They occur at elevation ranges from 5,000 feet to 13,000 feet that produce frigid soil temperatures with an annual mean soil temperature of 32°F to 47°F. The soils are found on mountainsides, hillsides, basalt flows, mountain toes, moraines, hilltops, ridges and colluvial slopes. Slopes range from 0 percent to 90 percent. Annual precipitation ranges from 8 inches to 45 inches. The soils in this group are shallow to very deep and are well drained to excessively drained.

ROCK OUTCROP-LITHIC CRYORTHENTS-CORBETT-NANAMKIN FAMILIES

The soils in this map unit were in material that weathered from mixed granitic, rhyolitic and andesitic rocks. These soils are found on mountainsides, ridges and colluvial slopes, with slope gradients in the range of 0 percent to 90 percent.

NEUSKE-BEARSKIN-HAYPRESS FAMILIES

The soils in this map unit were formed in material that weathered from granitic, basalt, metasedimentary and mixed rock. These soils are found on hillsides, basalt flows, mountain toes and mountainsides, on slopes of 0 percent to 90 percent.

8.3.4.3 Cryic Soil Temperature Regime Soils

In the cryic soil temperature regime, the mean annual soil temperature is 32 to 47°F. The mean annual summer soil temperature is lower than 47°F if a thin layer is present, and the soil is not saturated during some portion of the summer and 59°F if a thin layer is not present. Conversely, if the soil is saturated for a portion of the summer, then the soil temperature must be lower than 43°F if a thin layer is present and 55°F if it is not present.

The soils in this group were formed in material that weathered from granitic, basalt, metamorphic rocks, pumice, rhyolite, obsidian and ash. The elevation ranges from 7400 feet to 13,400 feet. These soils are found on mountainsides, hillsides, mountaintops, hilltops, terraces, and mountain basin; slopes range from 0 percent to 70 percent. Annual precipitation ranges from 12 inches to 45 inches.

STECUM-LABSHAFT FAMILIES

The soils in this map unit were formed in material that weathered from granitic, metavolcanic, metasedimentary and mixed rocks. These soils are found on mountainsides, mountain tops, moraines and terraces of slopes of 0 percent to 70 percent.

8.3.5 RESERVOIR SHORELINE AND STREAMBANK CONDITIONS

Reservoirs at the Project have surface areas spanning from 0.6 acres (Intake No. 3 dam) to 184 acres (Lake Sabrina) at elevations ranging from 4,500 feet to 10,700 feet above msl. This variation in elevation introduces a large range of climatic regimes and ecosystems across the Project. Generally, the shorelines of the reservoirs and streambanks are moderately vegetated (Photo 8.3-1), and previous riparian vegetation monitoring surveys have noted that the riparian vegetation was increasing in density or remaining the same along Bishop Creek, as compared to the baseline condition from the early 1990s, prior to the current in-stream flow requirements (Read 2015, Read 2020).

Photo 8.3-1. Shoreline along Project Reservoirs and Streams.

Vegetative cover is generally highest in locations with adequate soil development and hydrology (near Project streams and reservoirs), while areas with inadequate hydrology (areas away from reservoirs and streams) and areas that are closely underlain by bedrock, boulders or cobble have lower vegetative cover. There are very few locations with vertical banks along the reservoirs or stream banks, aside from localized stream bank erosion that results in vertical, or nearly vertical, banks. Monitoring during recent years has not documented significant changes to channel geomorphology (Read 2015, Read 2020). The presence and transport of large woody material (LWM), defined as dead/down wood >3” dia. and >4’ long, was assessed as part of the Sediment & Geomorphology

Study (AQ 6; Kleinschmidt 2022). Based on conversations with SCE staff and field observations at the six sites in the Project reaches of Bishop Creek, there is not a substantial LWM load in Bishop Creek bypass reaches. There are incidents of higher LWM in the system, such as after long drought periods followed by high flows, after blow-out of beaver dams, and also with contributions from unregulated tributaries (such as Coyote Creek). Most of the LWM is understood to pass through intake impoundments (over the spillway), with minimal accumulation in the impoundment sediment or on the intake trash racks. Further, the increase in riparian vegetation help stabilize the stream banks, further reducing bank erosion, which can result in increased LWM inputs to the channel.

Most of the reservoirs have moderately sloping banks and consist of colluvium deposited along the shoreline, alluvium transported into the reservoir by fluvial processes, or bedrock outcroppings. Stream bed substrate is dominated by boulders and cobble from glacial deposition, as well as alluvium (gravel and cobbles) transported by periodic high flows. There is a general armoring of the stream bed with glacially deposited stones. An analysis of stream bed substrate was performed in 1990 by Simon, Li & Associates to characterize substrate size from the junction of the Middle and South forks of Bishop Creek down to the downstream end of the Project. This study found that the channel substrate generally consisted of cobble or boulder-dominated substrates, with limited gravel substrates (although there was still gravel in the cobble and boulder-dominated substrates reaches). Additionally, this study indicated that the stream course development was controlled by bedrock and large boulders which limit streamflow to a relatively narrow channel, as these larger particles are not able to be transported by the current flow regime (SLA 1990). The AQ 6 Final Technical Report (FTR; Volume 3 of this DLA) found similar substrates in the five study sites re-evaluated in 2019, including channels dominated by cobble and boulder substrate. Soils in the region typically have particles ranging from boulder to clay, with most of the soil falling into the sand size class. Classification of the Project streams at the riparian vegetation monitoring sites resulted in classifications of B2a, B3a, and A3/A2 under the Rosgen geomorphology classification system (Rosgen 1996).

INTAKE IMPOUNDMENT SEDIMENT AND CHANNEL SUBSTRATE EVALUATION

A comparison of the sediment found in the intake impoundments (as sampled from previously dredged sediment from Intakes No. 2, 4, 5 and 6, as well as the LADWP impoundment directly downstream of Plant 6) was compared to the average substrate particle size at Riparian Monitoring Sites 3, 4, 5, and 6, as well as a new Site 7. This comparison shows that the intake impoundment sediment (Figure 8.3-3) is substantially finer than the substrate of Bishop Creek at the study sites (Figure 8.3-4; Kleinschmidt 2022). Therefore, the finer sediment in the intake impoundments (D_{50}< 6 mm) is understood to move through the free-flowing reaches of Bishop Creek, while the bed substrate (139 mm<D_{50}<600 mm) is relatively stable and not as easily mobilized in the studied Project reaches.

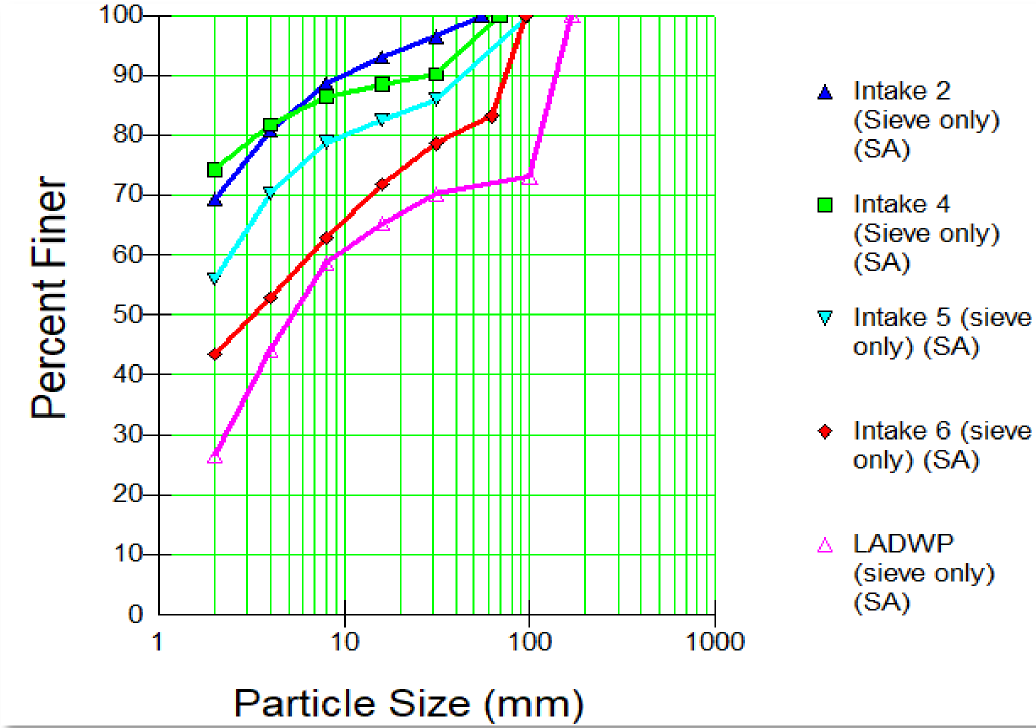


Figure 8.3-3. Dredged Sediment (intake impoundment) Particle Sizes.

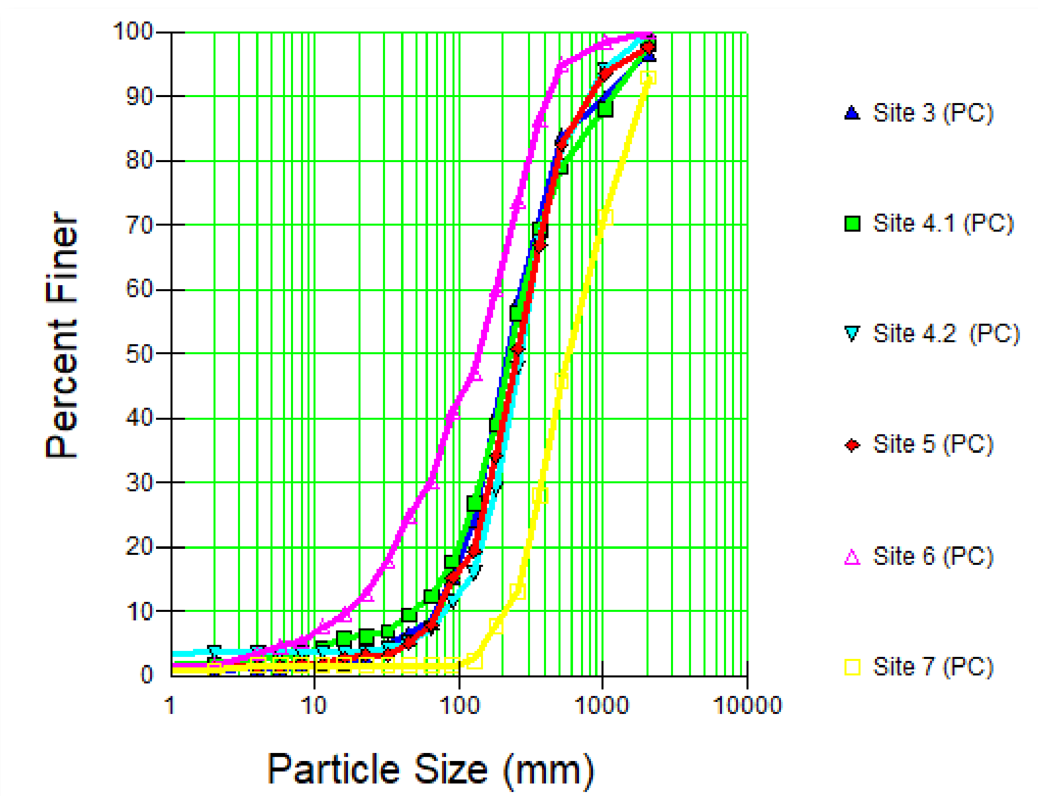


Figure 8.3-4. Riffle Substrate Particle Sizes.

SUBSTRATE MOBILITY EVALUATION

A Substrate Mobility Evaluation Study was completed during 2020 and 2021 to characterize the particle size distribution of sediments that are mobilized at or near bankfull flow conditions (Kleinschmidt 2022), with the results summarized here. Passive Integrated Transponder (PIT) tagged rocks ("tracer rocks") were deployed to inform sediment transport dynamics at two sites on Bishop Creek that correspond to the Riparian Monitoring sites established in the 1990s (Figure 8.3-5). Tracer rock sizes bracketed the average range of particle size (32 to 350 mm) associated with these sites, based on previous assessments (SWS 2022). The tracer rocks were deployed along cross sections, and at other representative geomorphic units between the cross sections, at each study site. Field measurements taken during the study included cross section surveys, longitudinal profile surveys of the channel bed and water surface, surface measurements of bed particle size distribution, deployment and recovery of tracer rocks, and photo documentation.

Pebble counts were conducted in 2020 and 2021 at Site 6 and in 2020 at Site 4. Site 4 was omitted in 2021 from pebble counts due to minimal tracer rock mobility. Tracer rock deployments were conducted at Sites 4 and 6 between August 2 and August 6, 2020. Tracer rock recovery efforts 1 and 2 were conducted on May 26 and July 20, 2021. Size classes and quantities of tracer rocks are described in Table 8.3-1. A total of 116 tracer rocks were deployed at Site 4, and 67 tracer rocks were deployed at Site 6. Pulse flows of 60-70 cfs and 120 cfs were released before each of the May and July recovery efforts, respectively.

SITE 4 RESULTS

Longitudinal profiles at Site 4 were approximately 550 feet long during sampling events in 2020 and 2021. The average slope of the reach was calculated at 0.04 ft/ft (4 percent) during both years. No significant changes were apparent between the 2019 and 2020 longitudinal profiles. The cross-section geometry was also similar between the two monitoring years, as was found when recent cross sections were compared to riparian monitoring effort cross sections surveys since 1990. The bed at all three cross sections was predominantly made up of cobbles, with gravel comprising less than 37 percent and boulders comprising less than 21 percent of the grain size distribution at each cross section. A summary of the pebble count data is provided in Table 8.3-4.

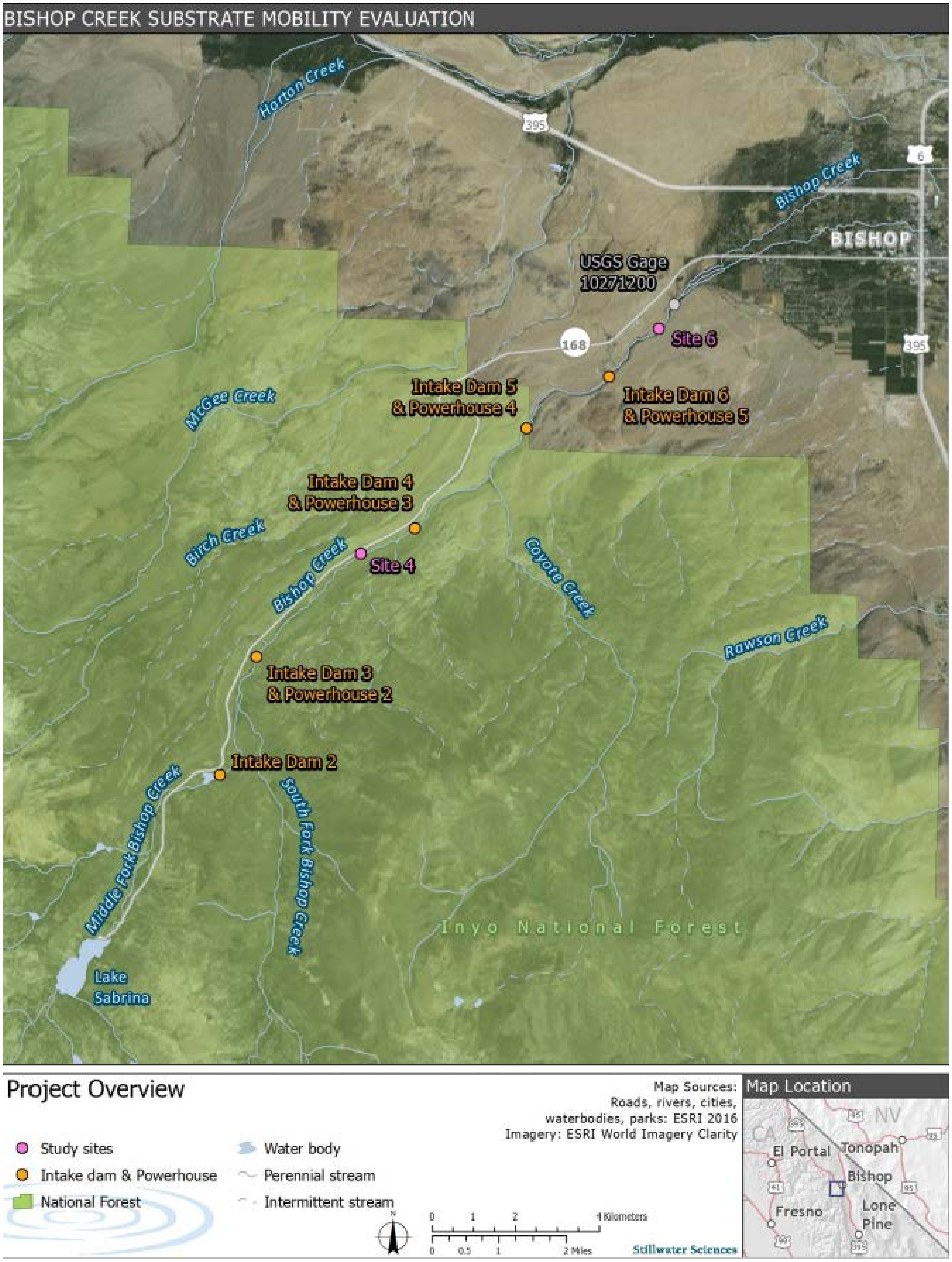


Figure 8.3-5. Bishop Creek Tracer Rock Evaluation Study Sites.

All 116 (100 percent) of the tracer rocks deployed on August 2, 2020, were recovered on May 26, 2021 after a pulse flow of approximately 70 cfs for a period of approximately 1 hour. Tracer rock displacement calculations between the deployment and first recovery effort showed that 114 (98 percent) of the recovered tracer rocks at Site 4 had not mobilized. The remaining 2 percent of tracers showed negligible transport distances, with a maximum displacement of 1.75 ft, indicating that short peak flows of 70 cfs do not substantially mobilize particles larger than 32 mm.

A pulse flow of approximately 120 cfs was released to the study reach shortly after the first recovery effort to determine what size particles would mobilize during a higher flow. One hundred and fifteen (98 percent) of the deployed tracer rocks were recovered during the second recovery effort on July 21, 2021. A 24-hour pulse flow of approximately 120 cfs resulted in mobilization of twelve tracers (11% of all tracer rocks at the site) and 17 percent of tracers with diameters <60 millimeters (mm). Ninety-three percent of tracers with diameters >60 mm showed no mobilization. The largest mobilized particle had a diameter 170 mm, although it was only transported 1.5 feet, so it may be due more to the method of placement than reasonably anticipated natural substrate transport. Tracer movement by particle size is summarized in Figure 8.3-6, but this indicates that particles in the 32-60 mm size classes begin to mobilize more frequently at flows of 120 cfs, but most (>80 percent) of the tracers <60 mm remained in place.

Site 6 Results

Longitudinal profiles at Site 6 were approximately 420 feet long during sampling events in 2020 and 2021. The average slope of the reach was calculated at 0.02 ft/ft (2 percent) during both years. Cross section profiles were also similar across years as was found when recent cross sections were compared to riparian monitoring effort cross sections surveys since 1990. The stream beds at all three cross sections were primarily made up of cobbles and gravel, with boulders comprising less than 21 percent of the pebble counts at each cross section during 2020 and 2021.

The 36 (54% of all tracers deployed) tracers that were recovered in the stream channel were undisturbed and showed no movement from their initial placement locations (31 tracers were disturbed by non-fluvial processes and were not included in these results but were present for the higher flow) after a 24-hour flow of approximately 60 cfs. Non-fluvial disturbance was determined by observations of lateral and upstream movement of tracer rocks, presumably from anglers or other recreating individuals. This necessitated resetting approximately half of the tracers at Site 6 in May 2021, which resulted in shorter residence times for approximately half of the tracers at Site 6 prior to the second, larger pulse flow. Sixty (90 percent) of the deployed tracer rocks at Site 6 were recovered during the second recovery effort on July 21, 2021. The pulse flow resulted in mobilization of 40 percent (n = 24) of all recovered tracer rocks and 84 percent (n = 16) of tracers <60 mm. Eighty percent (n = 34) of tracers >60 mm showed no mobilization. The largest mobilized particle was 197 mm and was transported 4.5 feet. This was the only mobile particle larger than the highest predicted critical D50 at the site and may have been due to the shorter period of time for the tracer to settle into the surrounding substrate prior to the high flow. Tracer movement by particle size is summarized in Figure 8.3-7. Since no tracers were mobilized at flows of 60 cfs, it was concluded that flows of this magnitude will not typically mobilize substrate particles larger than 32 mm in this reach of Bishop Creek, but at flows of 120 cfs, the majority (84 percent) of particles smaller than 60 mm mobilize at least 1 foot downstream (however this is also with minimal settling time for the tracers prior to the high flow event).

This substrate mobility study, when combined with the analysis of intake impoundment sediment and channel substrate sizes implies that for higher (e.g., bankfull) flows most of the sand and small gravel size particles flush downstream into the next impoundment, while coarse gravel, cobble and boulders generally remain stable and in place in the stream channel. The establishment of vegetation along the stream banks helps to limit the bank erosion and subsequent sediment inputs, thus reducing the overall sediment load in Bishop Creek.

Table 8.3-3. Tracer Rock Size Classes and Quantities by Site

Size Class	B-axis Range (mm)	Site[1]	Quantity
A	32–45	4	18
		6	12
B	45–64	4	18
		6	12
C	64–90	4	22
		6	11
D	90–128	4	19
		6	12
E	128–180	4	19
		6	12
F	180–256	4	14
		6	5
G	256–350	4	6
		6	3
Total		4	116
		6	67

[1]Sites 4.1 and 4.2 were treated as a single site (Site 4) for the tracer rock study because the sites are contiguous and tracer rocks were deployed between the two sites as well as at the cross sections.

Table 8.3-4. Summary of Pebble Count Data From 2020 for Site 4

Cross Section (XS) ID	Year[1]	D16 (mm)	D50 (mm)	D84 (mm)
4.9	2020	25	78	239
4.7	2020	3	91	323
4.2	2020	43	117	226

[1]Pebble counts were not conducted at Site 4 in 2021 due to limited tracer mobility after flushing flows

Table 8.3-5. Summary of Pebble Count Data From 2020 and 2021 for Site 6

Cross Section	6.8		6.6		6.5	
Year	2020	2021	2020	2021	2020	2021
D16 (mm)	17	18	23	60	4	23
D50 (mm)	76	74	69	130	58	137
D84 (mm)	283	177	58	137	199	256

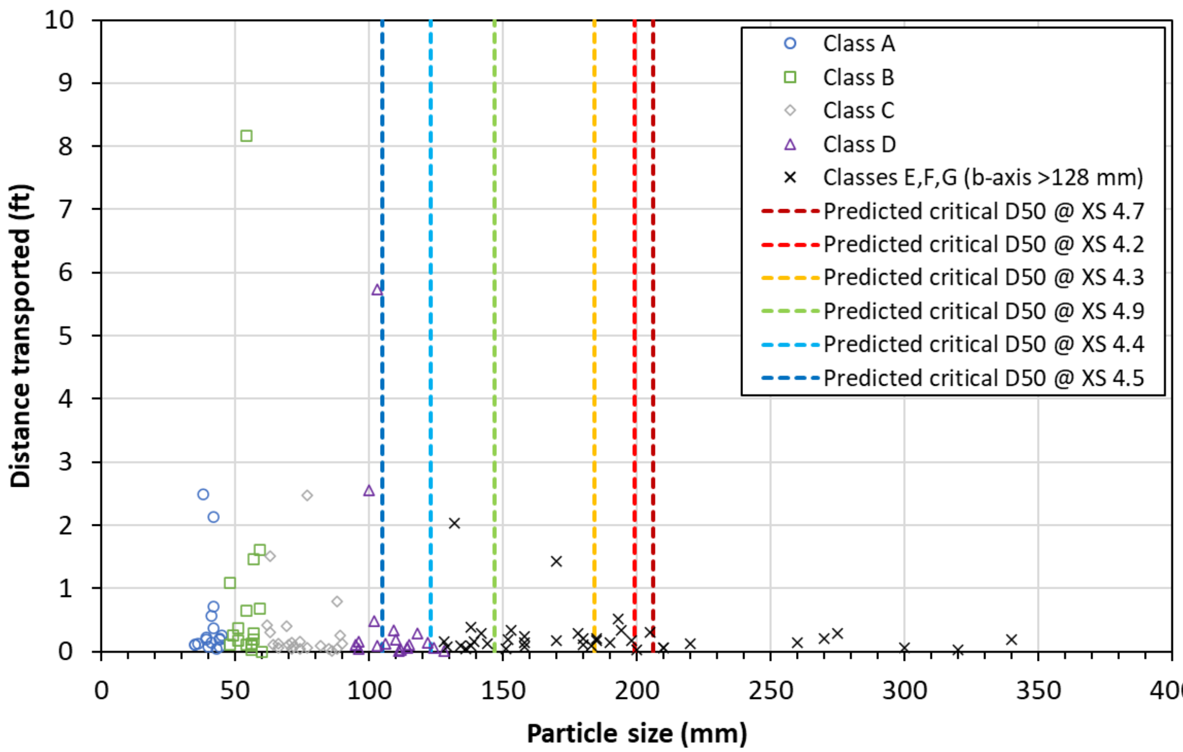


Figure 8.3-6. Transport Distance of Tracer Rocks by Particle Size at Site 4 for a flow of 120 cfs in this reach of Bishop Creek.
Grain Size Classes Follow Conventions Used in Table 8.3-1.

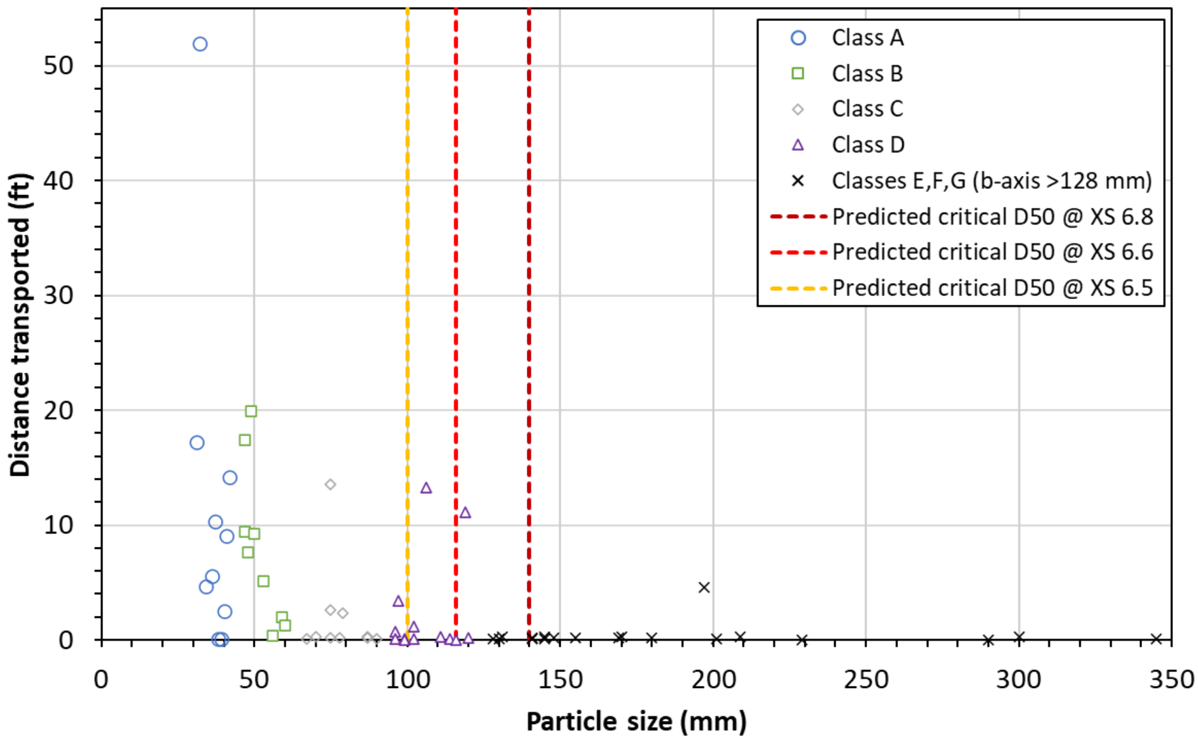


Figure 8.3-7. Transport Distance of Tracer Rocks by Particle Size at Site 6 for a flow of 120 cfs in this reach of Bishop Creek. Grain Size Classes Follow Conventions Used in Table 8.3-3.

8.3.6 EROSION

Channel geomorphology at Bishop Creek, McGee Creek, and Birch Creek generally shows no significant changes from baseline conditions documented in the early 1990s (Kleinschmidt 2022). This result is expected, given channel armoring by bedrock and large boulders. A minimum flow release for Bishop Creek was initiated in 1994 after the baseline study, which proved to have no detectable effect on channel stability, although it did appear to increase near-channel vegetation which increases bank stability through the vegetation's roots. Historically there are still periods of each year (often during snowmelt or fall thunderstorms) during which the flow in Bishop Creek exceeds the capacity of the powerhouses, resulting in an average annual peak flow in Bishop Creek above Plant 6 of approximately 202 cfs (Kleinschmidt 2022). The average annual peak flow in Bishop Creek post-minimum flow release initiation would be less than the historic channel forming flows due to the storage of some of the flow for power generation in the reservoirs; therefore, the channel is still experiencing smaller flows than the pre-Project condition, assuming all other climatic variables are similar. The hydrology of streams within the Project are further described in later sections, but in general, the Project is not known to have an adverse effect on erosion within the Project streams. In contrast, increased riparian vegetation growth on stream banks in reaches that were historically dry in summer prior to the minimum releases has added to the stabilizing effects of bedrock and large boulder substrates.

8.3.7 Potential Adverse Effects and Issues

The continued operation of the Project is not expected to negatively impact geological and soil resources. Monitoring during recent years has not documented significant changes to stream channel geomorphology, relative to baseline conditions that were previously characterized in the early 1990's. Additionally, minimal erosion has been documented in localized areas of the Project. Project operations are not believed to contribute to this erosion. The Project periodically draws down the water at each of their intakes thru a low-flow outlet, which has the potential to flush intake impoundment sediment into the downstream reach. Overall, the frequency, rate, and volume of sediment transport are reduced by the Project; however, Study results from the Sediment and Geomorphology Study (Volume 3) indicate that the Project bypass reaches of Bishop Creek between the impoundments generally have very coarse-grained sediment (e.g., cobble to boulder), while the sediment dredged from the intake impoundments is generally finer grained (e.g., sand to gravel). Thus, the release of the finer impounded intake impoundment sediment (sands and gravel) is likely to result in the flushing of that finer sediment down to the next intake impoundment or to the reaches of Bishop Creek beyond the Project after high flow events (e.g., 120-200 cfs), while large sediment releases during lower flows (e.g., less than bankfull) may result in deposition of sediment in pools of over 50 cm that will persist until the next high flow event (Sada and Hawkins, 1997; Kleinschmidt 2022).

The results of the Study found that the Bishop Creek is relatively stable, even after a summer of near and beyond-bankfull flows (140-230 cfs), as occurred in 2019. No substantial recent erosion was observed in the vicinity of the six monitoring sites after a period of several months of high flows. The D_{50} of channel substrate observed in the riffles of Bishop Creek was generally cobbles and boulders (139 to 600 mm), which aligned relatively well with D_{50} particle sizes found at these sites in the 1990 SLA Report. This supports the theory that this channel has reached equilibrium with the current flow regime and there is only minor flushing of sediment through the system as small sections of bank collapse, or surface runoff carries sediment into the channel from outside the primary Bishop Creek channel (such as Coyote Creek).

Maintenance activities are necessary and typical for the proper operation of any hydroelectric project. Periodic drawdown of the intake reservoirs is necessary for maintenance of the intake structure to maintain intake reservoir capacity and ensure operability of the low level outlets. During these drawdowns, water and sediment are released from the low-level outlets. The findings of the Sada and Hawkins (1997) study noted that intake impoundment sediment (fines, sand, gravel, but predominantly sand), when released in large quantities from the intake impoundment via low-level outlets, was removed from initial deposition locations in pools by 24-hour flushing flows of approximately 200 cfs. In all but three of the 30 pools surveyed, there was no substantial change to substrate composition due to the sediment release, when followed by a flushing flow.

Consistent with the natural deposition of sediment as other non-Project streams enter the Owens Valley's lower gradient reaches, sediment mobilized within the Project could naturally settle out downstream of the Project. This potential for deposition should be considered during the development of the Sediment Management Plan; the behavior of the sediment will be highly reliant on concurrent operations of water infrastructure between Plant 6 and the Owens River. SCE anticipates that the Sediment Management Plan will include measures for coordination and communication with downstream operators in order to minimize this potential effect.

The presence of LWM in the bypass reaches of Bishop Creek was not observed to be a primary driver of channel geomorphology, and based on the observations of the sediment dredged from the intake impoundments and SCE staff input, the Project does not substantially accumulate LWM, leaving most LWM in the bypass reaches and available for habitat use. Additionally, the riparian vegetation present adjacent to Bishop Creek stabilizes the stream banks and helps to generate additional woody vegetation near Bishop Creek.

8.3.8 Proposed Mitigation and Enhancement Measures

Current minimum flows in the Bishop Creek bypass reaches have allowed for riparian vegetation to grow in areas that were historically dry during the summer months. These flow releases provide conditions suitable for vegetation growth, which has a stabilizing effect on the surrounding stream banks, resulting in low stream bank erosion. The Licensee proposes continued minimum flows in the bypass reaches which will allow for the continued presence of riparian vegetation, which could help shade Bishop Creek and stabilize the stream bank, in addition to tempering the extreme minimum and peak flows in Bishop Creek that could dry out the creek or damage stream banks/infrastructure, respectively.

Agencies have commented that sediment entering the Bishop Creek system accumulates in the intake impoundments/forebays of the Project and have noted that this reduction in sediment transport could negatively impact the overall health of the stream system and the survival of native species.

SCE will develop and implement a Sediment Management Plan to improve the management of the geological and soil resources and will outline the approach to reintroduce sediment back into Bishop Creek via flushing flows, particularly the sediment in the bypass reaches of the Project. Following submittal of the DLA, SCE will work with stakeholders to finalize the Sediment Management Plan. This is described as PME-3 in Appendix A (Volume 2).

Overall, operation of the Project has a limited effect, if any, on geological and soil resources; therefore, no additional PME measures beyond this PME-3 are planned at this time.

8.3.9 References

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8.4 WATER RESOURCES

This section describes water resources in the Bishop Creek Project area. The discussion presented is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of Project Effects.

FERC requirements for this section are specified in Title 18 of the CFR Chapter I § 5.6(d)(3)(iii). FERC regulations require information on water resources, including water use (quantity) and water quality of waters affected by the Project.

8.4.1 DRAINAGE AREA

Streams in the eastern Sierra Nevada region are typical of headwater streams throughout North America; most headwater streams are characterized by high current velocities, large substrates, shallow water, limited undercut banks, and steep gradients (Sada 2005). The Bishop Creek Project area is composed of moderate to steep ridge and valley topography with elevations ranging from approximately 4000 feet above mean sea level (msl) to over 13,000 feet msl. Bishop Creek is a major stream with a total drainage area of approximately 104-square-miles, flowing northeastward approximately 28 miles from its headwaters to its confluence with the Owens River east of the City of Bishop. The gradient in the upper reaches of Bishop Creek are between 13.0 and 9.0 percent, with approximately 5.0 percent in the lower reaches (Sada 2005). The North, Middle, and South forks of Bishop Creek originate in nearby glacial basins separated by ridges. South Lake and Lake Sabrina on the south and middle forks of Bishop Creek are the major storage reservoirs in the watershed. McGee and Birch creeks, with a combined drainage area of approximately 35-square-miles, originate on alpine slopes north of the Bishop Creek watershed and are diverted to Bishop Creek through the existing hydroelectric facilities. McGee Creek is a small, moderately shallow creek with a gradient of approximately 6.0 percent. Birch Creek is small and shallow with a 10.0 percent gradient (Sada 2005). Figure 8.4-1 illustrates the relative areas of each of these drainage areas.

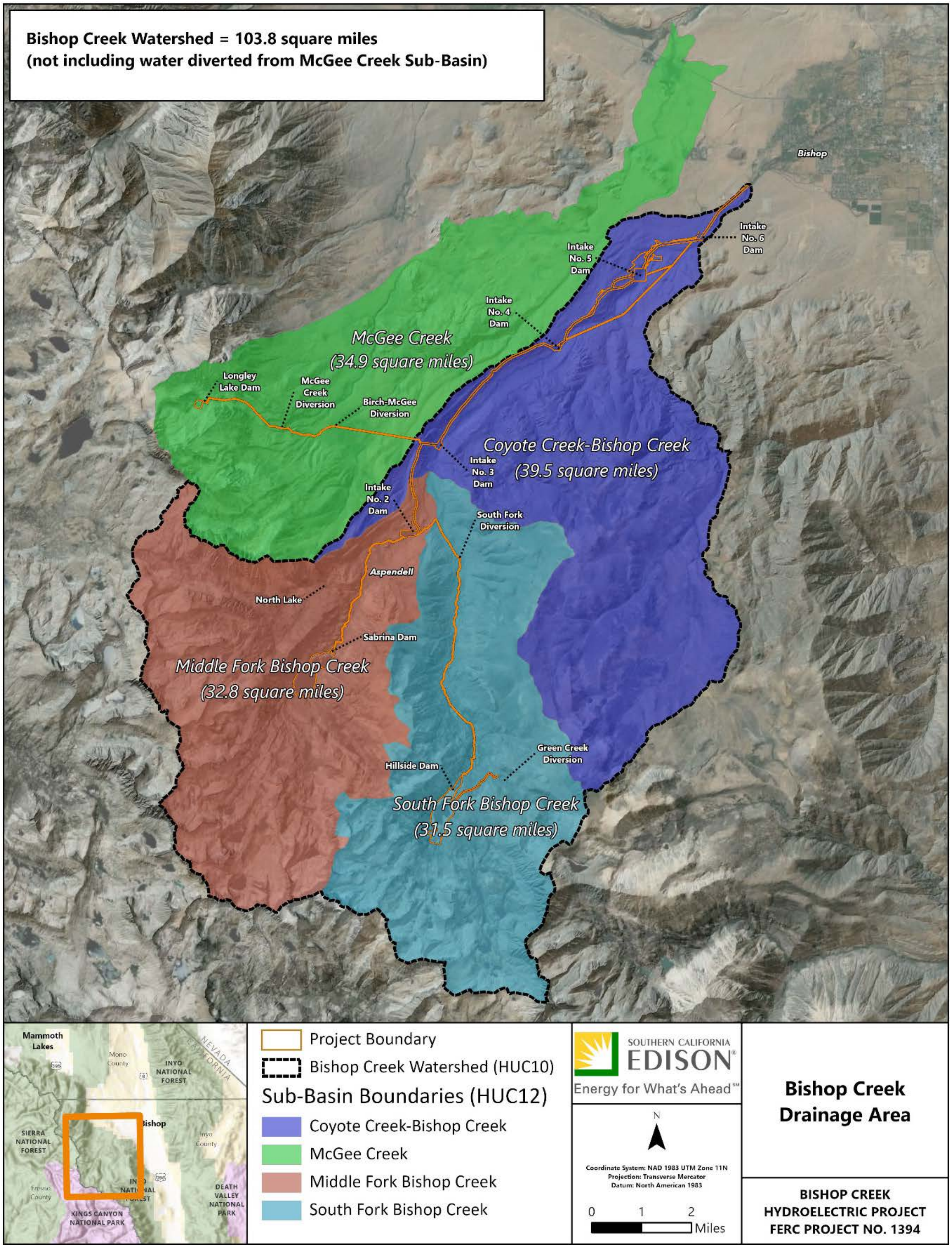

Figure 8.4-1. Bishop Creek Drainage Area.

8.4.1.1 Other Water Projects in the Basin

The dominant water project in the Owens River Valley is the Los Angeles Aqueduct, owned and managed by the LADWP. In the Bishop and McGee creek drainages, the Bishop Creek Project is the uppermost water resource project. Above the confluence of Bishop Creek and the Owens River, in the Mono Basin and Owens River headwaters, there are three other facilities: Long Valley, Upper Gorge, and Pleasant Valley (USACE 2021). From below the confluence to Owens Lake, there is only one other dam on the mainstem Owens River, the Tinemaha Dam, owned by LADWP. Approximately 5-miles downstream of Tinemaha reservoir, LADWP diverts most flow into the Owens River into the Los Angeles Aqueduct, passing through the North and South Haiwee reservoirs before continuing out of the Owens Valley (USGS 2017). Bishop Project coordination with other water projects in the Basin is discussed in Exhibit H of this application.

8.4.2 Flow Statistics

As required by Article 106 of the Bishop Creek Project's 1994 license, SCE in cooperation with U.S. Geological Survey (USGS) maintains a network of 17 streamflow gages on Bishop Creek and some of its tributaries (Figure 8.4-2). The following pages provide monthly mean flow statistics for the gages associated with the Bishop Creek Project. Data from two historical gages is also provided.

The monthly mean, minimum, and maximum flows for the Bishop Creek Project are listed below for the several gages monitored by SCE staff.

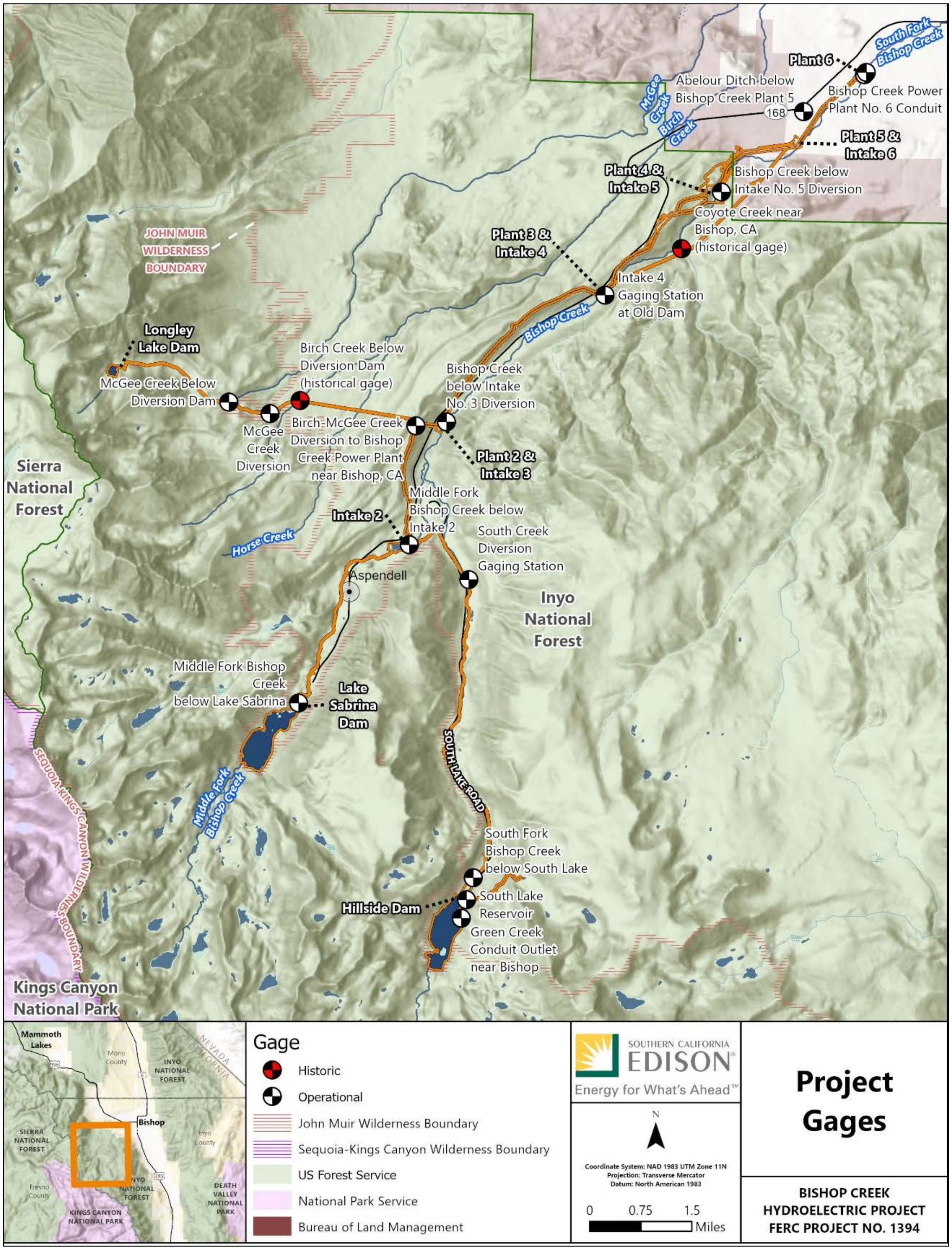

Figure 8.4-2. Location of Bishop Creek Project Gages.

Green Creek is a small tributary that normally flows into South Fork of Bishop Creek, below South Lake. SCE maintains a diversion on Green Creek. Table 8.4-1 presents the historical monthly mean streamflows measured from the Green Creek Conduit gage from 1987 to 2016. The Green Creek Conduit Outlet near Bishop gage (USGS No. 10270680) was discontinued in 2016 as the flow line is currently out of service.

Table 8.4-1. Mean Flow for Green Creek Conduit Outlet near Bishop, CA[1]

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1987-88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.220	0.960	0.501	0.074	0.000
1988-89	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.758	0.389	0.297	0.086	0.001
1989-90	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.305	0.195	0.305	0.057	0.000
1990-91	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.958	0.896	0.181	0.107
1991-92	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.916	1.14	0.445	0.230	0.046
1992-93	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.764	2.35	4.04	1.39	0.250
1993-94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.743	1.89	0.538	0.232	0.094
1994-95	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.368	1.55	1.09	0.083	0.000
1995-96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.598	4.46	2.85	1.31	0.537
1996-97	0.223	0.239	0.015	0.000	0.000	0.000	0.000	2.98	4.06	2.30	1.23	0.659
1997-98	0.367									5.75	2.81	2.08
1998-99									2.33	0.875	0.213	0.089
1999-00									1.84	0.402	0.130	
2000-01								1.74	1.77	0.538	0.027	
2001-02										0.110	0.000	0.000
2002-03									3.01	0.806	0.212	
2003-04									0.844	0.581	0.025	0.000
2004-05	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2005-06												
2006-07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2007-08												
2008-09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2009-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2010-11										0.000	0.000	0.000
2011-12												
2012-13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.220	0.960	0.501	0.074	0.000
2013-14	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.758	0.389	0.297	0.086	0.001
2014-15	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.305	0.195	0.305	0.057	0.000
2015-16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.958	0.896	0.181	0.107
Mean	0.04	0.02	0	0	0	0	0.01	0.63	1.5	1	0.38	0.2

Source: USGS 2018

[1] At USGS Station No. 10270680
[2] cubic feet per second

Downstream from the Green Creek Conduit gage, USGS gage no. 10270700 (South Lake near Bishop) measures the daily reservoir storage volume, in acre-feet. The gage has been in operation since 1989. Monthly statistics are not publicly available for this gage; however, reservoir levels are discussed in the Project Operations section of this document.

The next downstream gage is USGS gage no. 10270800 (South Fork Bishop Creek below South Lake) below South Lake. The maximum flow measured with the USGS gage for the period of record (1985 through 2020) was 168 cubic feet per second (cfs) (1.61-feet gage height) on July 18, 2017. Table 8.4-2 provides the monthly mean flow statistics from the South Fork of the Bishop Creek site. Most runoff occurs between May and September with the remainder of the period with monthly mean flows generally less than 22 cfs (USGS 2021a).

Table 8.4-2. Mean Flow for SF Bishop Creek below South Lake[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1985-86	29.4	25.5	24.3	17.3	26.3	26.1	45.8	38.2	55.5	72.8	56.5	34.2

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1986-87	44.7	18.4	37.2	24.5	9.36	9.49	9.49	18.6	15.1	27.8	33.4	22.9
1987-88	20.3	21.4	22.6	29.4	34.6	28.5	16.1	32.2	22.8	20.3	17.0	27.2
1988-89	16.5	12.4	12.1	10.1	13.7	9.53	16.7	35.3	14.0	17.1	39.4	38.3
1989-90	29.5	6.73	6.96	7.48	7.37	6.71	14.0	19.7	17.1	12.1	16.9	15.6
1990-91	10.8	10.6	9.98	7.59	7.45	7.75	10.2	20.5	7.70	9.45	20.5	26.4
1991-92	41.0	22.9	24.8	16.8	8.81	7.92	7.74	17.2	15.4	21.5	25.7	36.4
1992-93	21.2	13.4	13.3	35.8	54.2	19.3	12.8	26.0	15.0	19.4	49.4	29.2
1993-94	30.3	24.0	32.6	23.5	13.0	13.7	14.7	10.6	22.8	21.6	31.0	27.0
1994-95	15.7	16.4	18.3	17.1	47.0	52.5	52.6	31.8	23.7	61.4	87.7	39.8
1995-96	15.5	14.8	17.4	34.2	44.8	55.3	57.4	36.7	28.8	50.8	43.1	41.6
1996-97	25.1	20.9	23.0	29.5	51.7	61.6	21.0	18.6	15.3	61.1	41.7	29.7
1997-98	41.6	41.1	35.3	34.1	32.5	35.2	34.0	15.2	19.9	51.7	64.1	47.6
1998-99	27.8	39.2	35.7	26.5	21.8	23.0	31.4	22.0	17.4	20.9	31.6	30.7
1999-00	31.9	34.1	30.5	16.6	16.7	29.1	51.0	18.8	15.9	15.2	27.3	25.2
2000-01	17.4	30.1	27.2	18.8	15.5	20.3	20.0	16.2	16.5	34.1	29.3	17.0
2001-02	14.8	31.2	44.1	40.0	32.5	16.2	14.9	26.9	14.0	15.0	14.0	35.4
2002-03	30.4	17.6	18.0	15.6	15.0	14.2	17.4	21.4	16.2	16.7	28.4	21.0
2003-04	23.2	23.1	22.7	21.2	30.6	22.7	17.5	15.8	16.4	14.7	14.8	32.4
2004-05	22.0	19.4	22.1	21.5	22.7	26.5	34.9	22.6	45.8	74.9	41.7	27.8
2005-06	24.6	14.4	21.3	30.0	44.6	43.8	44.4	42.8	50.5	95.5	42.8	18.9
2006-07	28.5	38.5	36.8	24.0	18.7	18.0	16.5	15.5	14.8	15.8	19.3	24.2
2007-08	17.3	16.2	16.0	16.0	14.8	15.9	14.3	22.5	18.2	15.7	27.7	19.5
2008-09	16.0	15.9	16.0	15.4	14.5	14.0	15.4	15.9	16.9	26.8	38.3	30.1
2009-10	26.1	26.3	27.8	25.6	21.9	21.7	29.6	36.0	23.3	19.4	33.5	28.7

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2010-11	24.7	45.8	43.5	42.3	39.9	41.6	16.3	38.0	41.4	15.9	34.3	27.9
2011-12	24.5	19.7	24.6	17.2	15.3	14.8	16.4	33.5	38.7	28.6	34.6	15.0
2012-13	14.1	24.5	14.8	14.0	14.0	15.6	19.4	24.8	39.4	36.5	41.5	11.3
2013-14	5.52	5.01	5.06	4.28	4.95	6.14	14.8	31.8	37.5	31.4	22.8	9.40
2014-15	5.41	4.31	5.57	4.77	5.71	6.68	8.23	16.5	14.6	14.1	15.5	13.3
2015-16	8.86	8.82	8.59	8.57	8.64	8.50	14.3	21.5	14.7	17.6	20.8	18.2
2016-17	14.0	13.8	13.1	13.3	18.8	58.1	42.7	65.3	72.8	110.6	63.3	41.8
2017-18	33.1	15.5	16	16	15.7	15.5	17.4	36.7	41.2	59.8	33.3	31.8
2018-19	16.9	14.9	14.9	15	21.4	37	64.4	38.5	62.6	88.5	51.7	28.6
2019-20	28.5	28.2	24.6	24	14.4	15	14.1	14.5	14	20.1	32.8	20.2
Mean	23	21	22	21	22	23	24	26	26	35	35	27

Source: USGS 2021a

[1] At USGS Station No. 10270800
[2] cubic feet per second

Further downstream on the South Fork, SCE maintains a diversion structure that diverts a portion of the South Fork flow to the Intake No. 2 reservoir. Streamflow gage USGS No. 10270830 (South Fork Bishop Creek below South Fork Diversion Dam) is maintained just below the diversion structure. Table 8.4-3 provides the monthly mean streamflow statistics for the period of record (1994-2020) from this site. Most runoff occurs between May and October with the remainder of the period with monthly mean flows generally less than 10 cfs (USGS 2021b).

Table 8.4-3. Mean Flow for South Fork below South Fork Diversion Dam[1]

Water Year	Monthly Mean Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994-95	10.9	7.97	7.83	7.79	8.02	7.73	8.41	11.1	11.5	19.4	16.1	11.9
1995-96	11.0	8.53	8.13	8.19	8.40	8.86	9.5	11.2	12.1	12.6	12.4	12.5
1996-97		8.35	8.25	7.60	7.63	7.69	8.35	11.0	10.6	16.3	10.8	

Water Year	Monthly Mean Flow (cfs)											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1997-98	10.8	7.53	7.41	7.45	7.37	7.30	8.04	10.1	12.5	15.1	14.1	10.9
1998-99	10.9	7.39	8.43	7.58	7.54	7.65	8.11	10.6	10.5	10.4	10.5	10.5
1999-00	10.7		7.59	7.61	7.62	8.88	8.49	10.1	10.4	10.5	10.9	10.2
2000-01	10.1	7.42	7.29	7.33	7.46	7.47	7.9	10.1	10.5	10.8	10.9	11.3
2001-02	10.8	7.9	7.73	8.45	8.13	7.73	8.44	10.9	10.7	10.8	11.0	10.9
2002-03	11.0	9.05	7.57	7.55	7.63	7.60	8.12	11.0	11.0	11.0	10.7	10.9
2003-04	11.0	7.60	8.34	8.86	7.76	7.66	8.20	10.9	10.7	11.5	13.0	2.58
2004-05	0.000	0.000	0.000	0	0	0	1.25	13.4	13.7	14.6	14.3	12.0
2005-06	11.6	8.24	7.65	7.62	9.69	13.4	13.0	13.3	12.3	11.9	11.6	12.9
2006-07	13.2	11.0	11.0	12.9	11.0	14.0	14.0	14.0	14.0	12.5	11.0	11.0
2007-08	10.6	10.7	10.4	10.3	10.3	10.3	10.3	10.4	10.4	11.1	10.4	10.4
2008-09	10.1	9.13	7.48	7.49	7.50	7.50	8.15	10.0	10.7	11.0	11.0	11.0
2009-10	10.6	7.79	7.29	7.72	7.34	7.73	8.63	10.7	10.9	11.4	12.0	11.2
2010-11	10.6	7.83	7.75	7.64	7.70	7.64	7.64	11.9	10.8	10.6	11.0	11.0
2011-12	11.0	7.55	7.61	7.62	7.91	7.83	8.26	7.39	7.49	7.15	9.13	10.9
2012-13	11.0	8.01	7.40	7.55	7.50	7.50	8.00	10.6	10.4	10.9	10.3	10.4
2013-14	10.5	0.000	0.000	0.000	0.000	0.000	0.000	5.36	10.5	10.9	10.8	10.0
2014-15									10.0	10.0	10.0	10.2
2015-16	11.0	8.37	7.30	7.30	7.30	7.52	8.06	10.9	11.0	10.7	10.6	10.2
2016-17	10.7	8.05	7.79	7.80	7.82	8.13	8.50	10.9				13.0
2017-18	12.5	8.94	8.52	8.45	8.25	8.27	9.55	14.3	13.8	15	12.4	18.1
2018-19	11.6	8.96	8.54	8.65	9.47	9.87						12.5
2019-20	12.6	10.4	10.6	7.8	7.52	7.53	8.38	11	10.9	11.1	12	11.8
Mean	11	7.8	7.5	7.5	7.5	7.8	8.2	11	11	12	12	11

Source: USGS 2021b
[1] At USGS Station No. 10270830

USGS gage No. 10270872 (Middle Fork Bishop Creek below Lake Sabrina) is located on the Middle Fork of Bishop Creek, just below Lake Sabrina. The maximum flow measured at this gage for the period of record (1985 through 2020) was 270 cfs (2.15-feet gage height) on July 10, 1995 (USGS 2021c). Table 8.4-4 provides the monthly mean flow streamflow statistics for the period of record from this site. Most runoff occurs between May and September with the remainder of the period with monthly mean flows around 19 cfs.

Table 8.4-4. Mean Flow for Middle Fork below Lake Sabrina[1]

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1985-86	21.0	21.3	22.2	17.4	18.4	29.4	34.8	60.8	106.4	113.7	69.4	36.0
1986-87	32.5	14.7	21.9	20.5	11.5	11.8	9.91	19.2	29.5	43.0	35.9	25.5
1987-88	19.7	16.1	17.4	21.4	23.2	18.7	14.1	21.7	29.8	23.1	39.0	33.8
1988-89	20.1	15.7	13.5	13.5	20.5	24.4	34.8	13.2	24.7	32.9	17.5	21.9
1989-90	20.7	11.7	8.57	9.01	9.20	18.3	16.7	30.8	23.5	22.2	34.5	35.0
1990-91	11.8	9.74	11.3	7.63	7.11	6.91	24.1	18.7	11.6	48.0	36.0	26.9
1991-92	17.8	16.0	14.4	16.4	8.81	21.2	27.3	20.5	26.2	34.6	33.8	28.7
1992-93	16.7	8.56	10.2	25.8	43.8	15.6	10.4	42.5	50.1	85.1	59.3	29.8
1993-94	20.5	19.1	24.8	35.2	37.2	28.1	15.1	9.28	9.14	30.6	36.5	22.7
1994-95	18.0	20.1	20.3	21.1	43.6	41.6	34.8	18.8	50.0	147.2	107	49.4
1995-96	19.0	16.2	15.2	29.7	36.2	36.2	41.1	43.4	57.5	93.7	62.8	44.2
1996-97	19.1	20.5	20.4	29.7	46.1	32.3	17.0	25.0	91.1	81.7	46.1	33.2
1997-98	40.9	24.7	17.9	19.7	21.0	21.2	25.7	20.9	35.5	145.6	81.2	48.2
1998-99	25.5	36.4	30.3	25.0	20.8	20.0	13.6	21.0	31.3	68.4	37.6	33.9
1999-00	25.0	29.6	15.5	15.1	24.8	43.1	12.1	17.4	34.8	59.8	44.7	26.2
2000-01	19.5	29.9	26.2	16.5	14.5	14.8	18.0	17.5	55.6	58.5	40.6	41.1
2001-02	39.4	20.5	16.3	14.6	13.8	15.5	20.4	21.0	14.6	22.6	42.5	27.1
2002-03	13.0	10.2	16.8	15.0	17.0	15.1	20.3	20.5	50.5	60.0	46.8	23.4
2003-04	16.1	14.7	15.1	14.3	22.3	23.9	26.5	27.1	23.7	80.4	98.7	19.0

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2004-05	7.84	10.0	7.39	9.40	9.13	8.94	10.4	21.4	82.0	118.5	59.2	41.0
2005-06	45.7	51.9	32.6	13.2	7.42	10.1	14.4	102.9	102.0	118.9	57.7	27.1
2006-07	16.1	26.0	25.8	21.2	18.0	17.6	16.9	15.8	17.2	23.5	23.8	22.6
2007-08	18.5	17.9	13.8	13.2	14.8	15.9	22.7	25.1	20.7	39.9	40.7	21.5
2008-09	16.6	15.6	16.4	14.2	13.9	14.6	17.3	19.3	36.4	78.0	38.8	26.2
2009-10	22.9	18.6	16.6	16.6	21.3	44.6	30.1	17.9	18.9	121.5	44.8	27.1
2010-11	26.3	15.3	14.9	16.0	15.4	17.6	54.6	64.3	42.2	106.0	67.3	38.2
2011-12	38.9	22.8	22.5	17.0	15.3	15.3	15.0	16.1	29.0	43.4	38.5	42.3
2012-13	48.0	8.75	9.27	7.14	5.27	6.22	15.9	36.8	29.5	40.0	35.7	10.7
2013-14	5.46	4.41	4.94	4.29	4.96	6.64	14.0	25.4	26.1	21.7	15.4	17.4
2014-15	12.3	10.7	9.45	10.2	9.84	9.58	8.37	19.5	15.4	19.6	27.8	21.3
2015-16	9.99	10.0	9.21	7.82	7.35	9.36	16.2	26.6	35.7	55.7	55.0	25.8
2016-17	18.0	18.5	17.5	13.7	18.6	31.2	44.0	83.7	132.4	151.4	79.0	55.3
2017-18	19.4	14.2	15.5	11.3	9	12.3	23.8	45.2	70.4	94.9	61	16.2
2018-19	14.5	17	18	15.6	28.2	50.4	59	51.6	82.8	108.9	60.8	39.6
2019-20	17	17.4	13	13	12.9	13.7	26.1	62	49.5	42.5	36	25.4
Mean	22	18	17	16	19	21	23	32	44	70	49	30

Source: USGS 2021c

[1] At USGS Station No. 10270872

[2] cubic feet per second

Located further downstream on the Middle Fork of Bishop Creek, near the confluence with the South Fork, is USGS gage No. 10270877 (Middle Fork Bishop Creek Below Intake No. 2 reservoir). Table 8.4-5 provides the monthly mean streamflow statistics for the period of record (1988-2020) from this site. Most runoff occurs between May and October. Monthly mean flows during the remainder of the period are around 9 cfs (USGS 2021d).

Table 8.4-5. Mean Flow for Middle Fork Creek below Intake No. 2[1]

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1988-89	3.03	2.30	2.61	2.50	2.50	2.62	3.56	2.66	2.54	2.63	3.90	5.15
1989-90	3.96	2.34	2.78	2.61	2.61	2.60	2.63	2.71	2.72	2.78	2.51	2.57
1990-91	2.71	2.73		5.96	2.47	2.75	17.8				6.75	3.45
1991-92		2.44	2.37	2.38	2.42	2.32	2.34	2.52	2.69	2.59	2.54	2.52
1992-93	2.49	2.47	2.36	2.46	2.37	2.82	3.27					2.77
1993-94	2.85	2.74	2.52	2.47	2.9	2.96	2.71	2.65	2.58	2.54	4.35	6.07
1994-95	6.02	5.64	5.50	5.56	5.61	5.72	6.37	10.8				
1995-96	11.8	9.71	8.27	8.11	8.05	8.16	9.30					12.2
1996-97		7.9	7.39		7.30	7.42	8.01					10.9
1997-98		8.06	7.81	7.92	7.86	7.89		10.1				
1998-99	13.0		7.37	7.66	7.77	7.69	8.65	10.7	12.9		10.7	11.0
1999-00	11.3		7.5	7.47	7.51	7.68	7.91	11.2			11	11.0
2000-01	11.6		8.15	8.06	8.16	8.34	8.20				6.07	6.02
2001-02			5.68	5.53	5.49	5.56	5.56	5.50	6.04	6.01	5.89	
2002-03				7.06	6.77	6.66	6.99	11.6		11.6	11.0	11.0
2003-04	11.0	9.14	8.21	7.83	7.93	8.00						
2004-05	15.5	18.0	14.9	18.5	17.0	18.1						12.8
2005-06	11.3	8.76	8.58		8.53	8.83	9.09					15.0
2006-07	14.9		16.0						8.19	8.47	8.37	8.30
2007-08	8.36						10.6		13.9		11.0	11.0
2008-09	11.0	10.1	8.47		8.64		9.05	11.6				12.9
2009-10		8.31	7.80	7.84	7.60	7.67	8.83	11.1	11.2	12.0	12.0	11.4
2010-11	11.0	7.99	7.82	7.99	7.77	7.83	8.19	11.0	11.0	11.0	11.0	11.2

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2011-12	11.1	8.01	7.89	7.89	8.57	8.59	8.15	8.14	8.10	7.67	6.16	6.10
2012-13	6.11	6.12	6.13	6.15	5.85	5.87	5.84	5.76	5.71	5.75	5.88	5.76
2013-14	5.9	5.89	6.19	6.16	6.27	6.27	6.25	5.88	5.76	5.74	5.73	5.75
2014-15	5.71	5.86	5.76	5.66	5.67	5.67	5.66	5.65	5.71	5.77	5.65	5.80
2015-16	5.83	5.81	5.85	5.86	5.69	5.67	6.08	11.0	11.0	11.0	11.3	11.0
2016-17	11.0	7.92	7.99	7.89	7.80	7.83	8.10	11.0	10.8	10.0	11.6	11.2
2017-18	11.2	8.44	7.78	7.76	7.72	7.81	9.26	10	10.6	10.3	10.4	10.9
2018-19	12.1	8.13	7.82	7.6	7.65	8.06	8.39	10.8	11	11	11	11
2019-20	11	10	7.91	7.72	7.43	7.69	8.48	12	11	11	11	
Mean	8.9	7.0	7.1	6.7	6.7	6.7	7.3	8.4	8.1	7.7	8.1	8.7

Source: USGS 2021d
[1] At USGS Station No. 10270877
[2] cubic feet per second

Immediately below Intake No. 3 reservoir is USGS gage No. 10270885 (Bishop Creek below Intake No. 3 Diversion Dam). Table 8.4-6 provides the monthly mean streamflow statistics for the period of record (1994-2020) from this site. Monthly mean flows of this portion of Bishop Creek have been consistent, at approximately 14 or 15 cfs throughout the year (USGS 2021e).

Table 8.4-6. Mean Flow for Bishop Creek below Intake No. 3 Diversion Dam[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994-95		13.9	14.9	15.0	15.0							
1995-96	13.7	14.0		14.5	14.9	15.0						15.0
1996-97		15.1	14.8			15.0	14.4					15.0
1997-98		15.9		16.1	16.0	16.0	15.9	15.1				
1998-99			14.0	14.4	15.0	15.0	14.5	13.9	13.9		14.2	
1999-00			18.6	17.3	15.0		14.6	15.0			14.1	14.0

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
2000-01			15.0	14.7	14.0	14.0	14.4		14.0		13.1	14.0
2001-02			14.0	14.0	14.0	14.0	14.0	13.1	13.1	14.0	13.8	13.5
2002-03	14.0		14.3	14.2	14.0	14.0	14.0			15.0	14.2	14.6
2003-04	14.8	15.0	15.1	15.0	15.0	15.2						
2004-05	16.7	16.0	15.0		14.0		15.2					
2005-06						15.0						17.0
2006-07										14.0	14.0	14.0
2007-08							15.7					15.0
2008-09			15.0	15.0		15.0		15.0			15.0	15.0
2009-10		15.0	15.0	15.0	15.0	15.0						15.0
2010-11				15.0	15.0							
2011-12	15.0	16.3	16.6	16.8	15.2	14.8	15.0	15.0	14.6			15.0
2012-13		15.0	15.0	15.0	15.1		15.0		15.0			
2013-14	14.0	14.0	14.0	14.0	14.1	14	14.0			14.0		
2014-15			13.6	13.7	13.8		15.9	15.2	14.5	15.1	15.2	14.4
2015-16	14.0	14.0	14.0	14.0	14.0	14.0		14.4	14.0	14.9	15.0	14.6
2016-17	14.5	14.4	14.8	15.7	15.8	14.4	14.1	14.1	13.4	14.2	14.6	15.9
2017-18	16.4	14.3	14.3	13.9	14	14.2		14.2	13.8	13.7	13.6	14.5
2018-19	14.8	15	15	15.3	15.5	14.2	14.2	14.5	15.6	15.6	14.6	14.3
2019-20	14.3		16	14			13.7	16	13.8	14	14	14.5
Mean	15	15	15	15	15	15	15	15	14	14	14	15

Source: USGS 2021e
[1] At USGS Station No. 10270885
[2] cubic feet per second

Immediately below Intake No. 4 reservoir is USGS gage No. 10270940. Table 8.4-7 provides the monthly mean streamflow statistics for the period of record (1994-2020) from this site. Monthly mean flow of this portion of Bishop Creek throughout the year is approximately 6 cfs (USGS 2021f).

Table 8.4-7. Mean Flow for Bishop Creek below Intake No. 4 Diversion Dam[1]

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1994-95	6.16	5.65	5.87	6.31	6.41	7.72	6.66	6.22				
1995-96	6.26	5.79	6.25	6.09	6.11	6.09						7.38
1996-97		6.23	5.84		7.48		5.88					5.58
1997-98		6.04		5.33	5.50	5.60	6.29	5.81				
1998-99			6.15	5.88	8.19	5.70	5.79	5.53			6.21	6.43
1999-00			6.26	6.21	6.10		6.35	7.39			5.66	6.00
2000-01	6.12		6.30	6.10	5.54		5.79	7.33			6.33	6.53
2001-02			6.19	6.28	6.25	5.91	5.72		5.66	5.76	7.06	6.07
2002-03	6.28	6.84	7.08	6.35	5.72	5.31	5.36				6.75	6.23
2003-04	6.15	6.04	6.35		5.35	5.55						
2004-05	6.90	6.78	7.10	7.32	7.10		7.14					11.0
2005-06	11.0	11.9	12.0	11.6		8.37	8.08					13.0
2006-07			11.1								6.82	
2007-08	7.98					7.63	7.53					8.58
2008-09			8.59	8.73				8.04				6.9
2009-10	6.90	6.92	6.93	7.09	7.22		7.43	7.00				6.00
2010-11		6.35	7.40	7.36		7.67						
2011-12					9.11		6.73	6.91				
2012-13				5.71	5.69							5.65
2013-14	5.72	6.42	5.56	5.20	5.20				5.82	5.79	6.02	6.22
2014-15	6.08	6.57	5.40	5.30	5.23	5.25	5.21	6.25	6.23	6.19	6.21	6.29

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2015-16	6.32	6.36	6.39	6.29	6.21	6.20	5.83	5.75	5.72	5.99		
2016-17			5.53	5.66	5.70	5.71	5.79	5.93	5.86	5.80	5.78	6.64
2017-18	7.93	7.67	6.09	6.09	6.07	5.94	5.85	5.65	5.91	6.11	5.76	5.8
2018-19	5.78	5.7	5.7	5.71	5.58			6.14	6.12	6.04	6.01	6.03
2019-20	6.03	6.06	5.8	5.78	5.78	5.81	5.79	5.85	5.93	5.96	5.68	6.09
Mean	6.8	6.7	6.8	6.5	6.3	6.3	6.3	6.4	5.9	6.0	6.2	7.0

Source: USGS 2021f
[1] At USGS Station No. 10270940
[2] cubic feet per second

The USGS also maintained for a short period (1990 to 1996) USGS gage No. 10270960 (Coyote Creek near Bishop, CA) on Coyote Creek, an approximately 26-square-mile tributary to Bishop Creek that merges with Bishop Creek between Power Plant No. 3 and No.4. Table 8.4-8 provides the monthly mean streamflow statistics for the period of record from this site. Monthly mean flows remain consistent throughout the year, ranging between 3 and 6 cfs. The maximum flow measured at the USGS gage, for the period of record was 26 cfs (1.67-feet gage height) on June 12, 1995 (USGS 2021g).

Table 8.4-8. Mean Flow for Coyote Creek[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1990-91	3.09	3.30	3.15	3.25	3.61	3.67	4.35	4.71	3.15	2.31	2.14	2.32
1991-92	2.72	3.19	3.07	3.10	3.33	3.46	4.97	3.28	2.51	2.01	1.92	2.07
1992-93	2.63	3.00	2.99	3.20	3.23	3.63	5.08	7.30	4.09	2.67	2.85	2.78
1993-94	3.60	3.76	3.73	3.65	3.78	4.17	4.82	3.83	2.51	2.26	2.13	2.70
1994-95	2.93	2.98	3.00	3.42	3.44	3.98	4.37	9.20	12.9	6.06	3.89	3.88
1995-96	4.70	5.10	5.34	5.00	5.35	5.49	8.16	7.65	5.13	4.61	4.60	
Mean	3.3	3.6	3.5	3.6	3.8	4.1	5.3	6.0	5.0	3.3	2.9	2.8

Source: USGS 2021g
[1] At USGS Station No. 10270960
[2] cubic feet per second

Immediately below Intake No. 5 reservoir, USGS gage No. 10270970 is located in Bishop Creek. Table 8.4-9 provides the monthly mean streamflow statistics for the period of record (1994-2020) from this site. Monthly mean flows of this portion of Bishop Creek have been fairly consistent, ranging from 19 to 21 cfs (USGS 2021h).

Table 8.4-9. Mean Flow for Bishop Creek below Intake No. 5 Diversion Dam[1]

Water Year	Monthly Mean Flow2											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1994-95	18.8	18.7	19	19.0	19.0	19.3	18.9	18.9				
1995-96	19.0	19.0		19.1	19.0	18.9						19.3
1996-97		18.6	18.3		19.0		20.0					
1997-98		19.0	18.9	18.2	19.0							
1998-99			20.0	19.5	19.9	19.6	19.4	19.5	18.3		20.1	20.5
1999-00			20.1	20.0				19.3				20.7
2000-01	20.8		19.1	19.0	19				20.5			19.0
2001-02											20.0	20.0
2002-03				20.2	19.8	20.1	19.9				19.7	19.6
2003-04	19.4	19.3			19.6	19.6		20.4				
2004-05	19.7		19.7		20.0		20.0					
2005-06												20.3
2006-07								19.4	19.5	19.7		19.8
2007-08					21.1		20.3					20.0
2008-09		19.7	19.5	20.1				20.7				
2009-10		19.0		23.3	22.1							20.9
2010-11												
2011-12					21							
2012-13		21.1	21.8	22.7	19.4		19.0		19.0			19.4
2013-14	19.1	20.1	20.0	19.5	19.6	19.1	19.0				20.3	20.5
2014-15					20.2	19.9	19.0	19.0		18.7	20.0	20.0

Water Year	Monthly Mean Flow2											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2015-16	19.1	19.2	19.0	19	19.7	20.0		20.0			21.6	21.0
2016-17				19	19.7	21.1						
2017-18					21.3	18.3						
2018-19	19.8	19.3	19.2	19.1	18.9	19.8	21.8	22	22.6	23	29	
2019-20	19.9	19.3	19.1	18.8	19.3	19.6	20.8	19.5	20	20.1	20.2	20.9
Mean	20	19	20	20	20	20	20	20	20	20	21	20

Source: USGS 2021h
[1] At USGS Station No. 10270970
[2] cubic feet per second

Located in between the Intake No. 5 site (USGS gage No. 10270970) and Power Plant No. 6 is USGS gage No. 10270985 (Abelour Ditch near Bishop, CA). Table 8.4-10 provides the mean streamflow statistics for the period of record (1985-2020) for the site. Most runoff at this site occurs between May and September, with flows around 1.9 cfs for the remainder of the year (USGS 2021i).

Table 8.4-10. Mean Flow for Abelour Ditch below Bishop Creek Plant No. 5[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1985-86	2.01	2.22	2.2	2.24	2.15	2.04	1.44	2.08	2.65	2.57	2.2	2.19
1986-87	2.36	2.47	2.31	2.15	1.96	1.96	2.19	2	1.99	2.12	2.23	2.25
1987-88	2.19	2.16	2.25	2.16	2.02	2.32	2.2	1.93	2.16	2.33	2.12	2.11
1988-89	2.02	2	1.99	1.93	1.89	2.04	1.93	2.12	2.1	2.1	2.09	2.11
1989-90	2.04	2.01	1.91	1.82	1.94	1.93	1.93	1.97	1.95	1.97	2.01	1.99
1990-91	1.87	1.8	1.82	1.83	1.7	1.7	1.86	1.88	2.08	1.95	1.85	1.89
1991-92	1.9	1.88	1.8	1.75	2	1.96	1.91	1.9	1.9	1.91	1.88	1.97
1992-93	1.96	1.76	1.77	1.88	1.82	1.97	2.03	2.23	2.47	2.57	2.65	2.3
1993-94	2.19	2.2	1.94	1.86	1.91	1.92	1.92	2.02	1.95	2.09	2.14	2.25
1994-95	2.1	1.95	1.89	1.97	1.91	2.05	1.86	2.42	2.41	2.62	2.59	2.52

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1995-96	1.97	1.93	1.85	1.98	1.99	1.88	2.41	2.38	2.41	2.32	2.73	2.48
1996-97	1.96	1.04	1.95	2.3	2.11	2.06	2.13	2.09	2.15	2.04	2.1	2.09
1997-98	2.18	1.96	2.01	1.85	1.93	1.95	2.13	2.06	2.02	2.17	2.15	2.27
1998-99	1.98	1.53	1.75	2.07	2.05	1.91	1.83	2.04	2.17	1.99	2.09	2.19
1999-00	2.32	1.77	1.87	1.75	1.7	1.84	1.99	1.88	2.05	1.96	2.13	1.98
2000-01	2.09	1.39	1.64	1.96	1.81	1.84	1.92	1.8	2	2.16	1.95	2.04
2001-02	1.45	1.43	2	1.95	1.94	1.78	1.83	1.88	1.84	2.08	2.03	2.11
2002-03	1.79	1.71	1.82	1.81	1.9	1.9	1.87	1.83	1.97	1.81	2.07	2.01
2003-04	1.93	2	2	2	2	1.89	1.49	1.99	2.02	1.9	2.19	2.62
2004-05	1.89	1.8	1.8	2.53	1.87	1.74	1.78	1.95	2.14	2.71	2.34	2.19
2005-06	2.29	2.35	2.25	1.85	2	1.93	1.88	2.12	2.15	2.15	2.15	2.43
2006-07	2.45	2.3	2.29	2.14	2.12	2.54	1.89	1.67	1.65	1.64	1.7	1.7
2007-08	1.71	1.99	1.92	1.8	1.77	1.79	1.8	2.4	2.03	2.12	2.22	2.07
2008-09	2.05	1.96	1.9	1.85	1.8	1.82	1.79	2.18	2.19	2.22	2.48	2.37
2009-10	2.16	2.12	1.86	1.9	1.94	1.97	1.91	1.99	1.8	1.75	2.01	2.13
2010-11	1.74	1.99	1.92	1.92	2	1.85	1.73	1.74	1.9	2.14	2.1	1.95
2011-12	2.04	1.91	1.74	1.79	1.8	1.79	1.76	1.83	1.92	2	2.1	2.04
2012-13	1.88	1.9	1.79	1.78	1.86	1.82	1.77	1.79	1.92	1.84	1.82	1.84
2013-14	1.8	1.7	1.41	0.	1.48	1.68	1.75	1.78	1.8	1.86	1.94	1.84
2014-15	1.8	1.89	1.66	1.75	1.82	1.75	1.62	1.66	1.71	1.82	1.74	1.75
2015-16	1.87	1.77	1.79	1.9	1.88	1.89	1.76	1.71	1.83	1.85	1.88	1.96
2016-17	1.83	1.76	1.75	1.87	1.66	1.89	1.95	1.83	2.08	2.23	2.02	1.75
2017-18	2.12	1.9	1.76	1.78	1.8	1.86	1.98	1.99	1.76	1.82	1.9	1.83
2018-19	1.68	1.8	1.86	1.8	1.83	1.87	1.8	1.85	1.81	2.33	2.08	2.03

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2019-20	2.25	2.5	2.48	2.18	2.21	2.15	2.22	1.78	1.7	2.31	2.41	2.01
Mean	2	1.9	1.9	1.9	1.9	1.9	1.9	2	2	2.1	2.1	2.1

Source: USGS 2021i
[1] At USGS Station No. 10270985
[2] cubic feet per second

The USGS also maintains gage USGS No. 10271200 (Bishop Creek Above Power Plant No 6 Near Bishop, CA) on Bishop Creek immediately above Power Plant No. 6. Table 8.4-11Table provides the monthly mean streamflow statistics for the period of record (1988-2020) from this site. Similar to the South Fork gage, most runoff occurs between May and September. During the remainder of the year, monthly mean flows average approximately 12 cfs. The maximum flow measured at this site for the period of record was 453 cfs (3.77-feet gage height) on July 23, 1998 (USGS 2021j).

Table 8.4-11. Mean Flow for Bishop Creek above Power Plant No. 6[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988-89	0.211	0.369	0.278	5.92	0.306	0.184	0.20	0.133	0.114	0.026	0.107	0.357
1989-90	0.180	0.268	0.325	0.252	0.412	7.72	5.02	0.252	0.12	0.140	0.167	0.216
1990-91	0.193	0.190	0.196	0.211	0.244	5.46	0.21	0.153	0.504	1.25	0.354	0.372
1991-92	0.171	0.285	0.333	0.385	2.35	0.188	0.177	0.124	0.064	0.035	0.048	0.082
1992-93	0.106	0.193	0.187	0.171	0.21	0.277	0.193	19.1	23.4	61.0	35.9	1.98
1993-94	1.78	14.9	1.58	1.55	1.58	7.54	1.87	1.92	1.66	1.65	1.93	2.42
1994-95	1.76	1.56	2.36	8.50	2.15	1.69	2.01	1.71	61.6	239.7	171.1	17.8
1995-96	1.97	1.89	5.34	1.89	1.41	1.36	15.9	29.9	74.6	97.5	26.7	2.33
1996-97	5.78	1.78	1.52	38.6	1.01	1.65	2.16	15.5	86.7	94.5	22.2	2.90
1997-98	37.4	4.37	1.29	1.35	10.9	1.23	0.75	1.12	35.1	229.2	103.9	37.5
1998-99	12.7	24.0	1.25	0.945	3.53	4.61	1.18	1.55	10.3	24.6	1.15	0.951
1999-00	3.82	32.3	1.02	0.819	0.999	2.23	1.09	2.12	39.9	11.6	7.25	0.799
2000-01	22.6	28.4	6.09	1.59	1.68	1.57	7.48	27.8	13.7	65.1	1.31	0.956

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
2001-02	12.2	68.1	79.1	31.6	14.9	53.1	66.0	44.9	0.974	2.43	1.02	1.15
2002-03	27.4	1.24	2.95	1.04	1.14	1.55	2.55	2.40	21.1	3.43	1.34	1.18
2003-04	0.951	0.605	0.713	0.476	0.627	1.41	9.61	1.11	16.5	13.9	36.5	40.8
2004-05	55.1	54.3	52.9	5.36	0.539	0.597	0.514	14.8	86.1	171.9	39.9	82.9
2005-06	96.2	91.5	81.2	72.5	79.9	0.996	0.987	110.7	147.8	204.0	36.8	0.812
2006-07	2.96	2.04	1.27	1.09	0.904	1.17	0.843	0.590	5.24	0.401	0.36	0.399
2007-08	2.32	47.5	33.5	1.84	0.920	0.986	8.36	99.3	111	38.6	0.256	0.260
2008-09	0.437	0.332	0.382	0.606	0.924	2.87	0.985	1.83	4.42	29.3	0.302	0.182
2009-10	0.420	32.6	65.9	63.7	63.3	85.8	86.0	97.5	151.7	262.6	117.4	0.954
2010-11	0.594	28.3	0.674	0.663	1.21	3.88	77.2	34.3	65.5	120.4	51.5	3.31
2011-12	0.948	1.13	1.00	1.01	1.83	3.85	1.96	1.26	0.803	1.03	1.14	1.22
2012-13	5.23	0.825	0.657	0.672	0.494	0.498	0.758	0.657	0.463	6.60	0.346	6.05
2013-14	0.46	0.392	0.445	0.462	0.497	0.593	0.436	0.734	1.02	1.18	1.26	1.24
2014-15	0.974	15.6	13.2	1.31	1.29	1.20	1.04	1.11	0.914	0.565	1.51	1.55
2015-16	1.66	2.04	2.20	1.84	1.89	1.84	1.66	1.35	15.1	8.82	1.10	1.17
2016-17	1.05	48.4	1.17	0.903	0.860	1.26	9.41	114.6	252.8	275.1	80.1	14.8
2017-18	24.2	38.2	36.4	1.11	3.83	55.5	85.8	136.5	193.1	144.2	13.8	2.16
2018-19	1.58	1.48	27.9	56.7	74.5	109.8	40.9	53.2	148.8	176.7	46.6	12.6
2019-20	1.21	33.3	11.8	0.543	0.868	4.76	5.02	4.95	2.45	20.6	1.55	1.22
Mean	10	18	14	9.6	8.7	11	14	26	49	72	25	7.6

Source: USGS 2021j
[1] At USGS Station No. 10271200
[2] cubic feet per second

Immediately below USGS gage No. 10271200, a separate gage, USGS No. 10271060 (Power Plant No. 6 Conduit) is maintained by the USGS in Bishop Creek. Table provides the monthly mean streamflow statistics for the period of record (1989-2020) measured by this site. Like the Power Plant No. 6 site above it, flows at this site are highest between

May and September. The rest of the year flows range between 48 and 71 cfs (USGS 2020k).

Table 8.4-12. Mean Flow for Bishop Creek Power Plant No. 6 Conduit[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989-90	79.6	44.8	42.1	42.4	42.2	44.3	61.3	91.2	88.8	83.4	81.1	79.4
1990-91	46.8	45.6	44.2	37.2	36.2	33.4	62.5	84.4	97.7	115.2	87.1	82.5
1991-92	82.7	63.0	60.5	56.6	38.0	52.2	67.8	85.5	86.1	86.7	86.9	87.8
1992-93	62.3	45.9	45.7	87.3	120.6	64.2	62.1	135.3	142.8	143.0	133.8	94.9
1993-94	75.7	53.4	81.4	81.2	72.3	58.6	63.3	70.4	104.7	100.2	96.3	75.5
1994-95	60.8	58.4	58.0	54.5	118.5	131.2	127.3	122.4	151.4	152.9	153.5	138.2
1995-96	73.4	65.5	63.3	98.2	120.5	135.2	142.9	147.4	146.3	151.5	149.5	132.2
1996-97	73.2	82.3	80.5	87.6	143.5	143	96.1	135.9	143.1	143.5	135.3	109.0
1997-98	79.7	100.3	88.4	89.0	80.1	95.6	105.3	102.8	143.4	143.5	145.9	135.0
1998-99	81.2	99.2	100.8	83.7	71.0	77.1	80.1	108.8	126.0	126.4	109.4	96.0
1999-00	80.1	57.5	71.2	57.3	67.7	99.3	99.0	104.9	103.5	120.2	104.3	81.0
2000-01	39.8	58.2	76.2	60.5	55.1	66.7	70.1	99.4	129.1	85.8	107.5	89.5
2001-02	71.2	0.409	0.322	51.8	61.6	0.000	0.000	49.5	111.2	92.8	87.7	88.1
2002-03	37.9	56.8	58.9	56.7	56.9	54.1	67.0	101.1	144.2	133.4	110.8	72.2
2003-04	62.5	63.6	64.9	62.1	81.6	81.5	73.0	96.6	100.8	136.7	109.6	35.5
2004-05	0.017	0.034	0.001	53.6	54.8	62.4	77.2	122.2	145.4	140.5	133.8	16.9
2005-06	0.000	0.000	0.292	0.771	0.369	89.0	98.9	147	143.6	143	129.8	86.5
2006-07	80.8	99.5	96.3	77.4	65.8	65.2	66.0	77.2	73.1	77.5	77.4	78.1
2007-08	60.8	4.43	18.5	51.4	52.9	56.1	63.1	0.00	0.00	82.6	109.1	71.8
2008-09	60.3	56.8	58.1	56.6	56.0	54.8	67.5	98.0	114.9	143.3	111.9	82.9
2009-10	73.5	34.0	0.000	0.023	0.000	0.000	0.006	0.000	0.000	0.000	4.23	83.8
2010-11	80.1	63.2	94.3	91.5	86.6	90.5	43.2	142.5	142.1	138.1	137.5	113.0

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2011-12	106.0	77.6	76.3	62.9	57.8	57.5	66.4	93.8	107.1	107.4	107.6	82.6
2012-13	80.8	57.6	49.7	46.3	43.5	47.8	61.7	95.4	107.4	101.2	103.7	32.3
2013-14	27.8	26.3	28.1	27.5	27.6	31.4	51.9	91.0	105.7	79.9	62.7	44.6
2014-15	33.5	17.1	20.7	33.4	34.1	34.3	34.5	62.1	66.9	66.3	63.5	49.1
2015-16	36.7	35.6	34.4	34.0	34.1	38.8	59.1	92.8	125.2	119.8	106.3	63.1
2016-17	50.0	0.595	50.5	54.1	67.2	124.3	131.8	147.6	146.9	147.1	149.0	148.6
2017-18	68.8	26.8	24.7	59.2	51.1	0	0	0	0	90	133.8	76.5
2018-19	58.3	58.1	30.4	0	0	0.01	138.4	116.2	149.1	149	148.3	109.6
2019-20	82.6	45.9	62.3	70.1	57.4	53.9	77.4	142.7	130	105.4	103.3	71.5
Mean	62	48	51	56	60	63	71	96	109	113	109	84

Source: USGS 2021k
[1] At USGS Station No. 10271060
[2] cubic feet per second

McGee and Birch creeks are minor streams with a combined drainage area of approximately 35 square miles. McGee Creek flows approximately 15 miles to its confluence with the Owens River, while Birch Creek flows approximately 3 miles to the existing diversion, after which it becomes intermittent. Both streams originate on alpine slopes to the north of Bishop Creek watershed.

The USGS maintained for a short period (1995-1999) gage USGS No. 10268282 on Birch Creek below the diversion structure (Birch Creek below Diversion Dam) Table 8.4-13 provides the monthly mean streamflow statistics for the period of record from the Birch Creek below Diversion Dam site. Most runoff at this site occurred between June and November, with flows generally less than 1 cfs the remainder of the period (USGS 2021l).

Table 8.4-13. Mean Flow for Birch Creek below Diversion Dam[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1995-96		0.739	0.806	0.794	0.798	0.765	0.721	1.01	3.43	6.84	1.47	0.814
1996-97			0.456		0.430	0.415	0.382	0.483			0.579	
1997-98		0.406	0.408	0.412	0.391	0.379	0.411	0.387				0.754

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1998-99			0.429	0.367	0.393	0.396	0.350					0.945
Mean	1.2	1.1	0.65	0.52	0.50	0.49	0.47	0.63	3.4	6.8	1.0	0.84

Source: USGS 2021l
[1] At USGS Station No. 10268282
[2] cubic feet per second

SCE and USGS maintain gage USGS No. 10268225 (McGee Creek Diversion). Table provides the monthly mean streamflow statistics for the period of record (1986-2020) from this site. Flows are limited by the size of the diversion pipe, but like other sites, the highest flows are recorded in the spring and late summer, between May and September (USGS 2021m).

Table 8.4-14. Mean Flow for McGee Creek Diversion[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1986-87	3.69	1.68	1.19	1.09	0.739	0.784	1.74	4.07	9.12	9.08	6.73	3.82
1987-88	2.16	1.49	0.958	0.797	0.725	0.891	1.55	3.85	6.55	9.71	6.01	6.68
1988-89	1.94	1.14	0.95	0.877	1.04	1.06	2.27	3.88	5.95	8.23	5.11	4.33
1989-90	3.25	1.13	0.759	0.659	0.715	0.99	2.08	3.06	4.46	8.38	4.60	5.58
1990-91	1.62	1.04	0.765	0.656	0.554	0.821	0.911	2.60	7.79	7.12	5.21	4.97
1991-92	2.90	1.48	1.19	0.806	0.747	0.851	1.77	3.48	4.71	5.55	4.63	2.71
1992-93	3.94	1.27	1.03	0.822	0.781	0.888	1.43	5.57	10.2	13.4	8.68	7.71
1993-94	2.39	1.51	1.20	0.878	0.830	1.01	1.88	3.48	8.91	8.32	4.77	3.45
1994-95	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.22	17.1	11.0	5.88
1995-96	1.36	0.101	0.000	0.000	0.000	0.000	0.000	2.92	14.5	15.8	8.23	3.87
1996-97	1.40							6.36	12.9	12.9	8.38	5.54
1997-98	1.96									13.5	10.4	8.31
1998-99	1.31								9.15	11.3	6.06	3.00
1999-00	1.19								10.7	9.07	5.86	3.65

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
2000-01									7.03	7.85	4.59	2.86
2001-02	2.06							2.19	8.7	8.58	3.33	1.66
2002-03	1.30								11.2	8.80	3.81	2.90
2003-04									7.84	7.66	3.49	1.25
2004-05										10.6	7.19	1.99
2005-06	0.807									11.8	7.23	2.71
2006-07									4.21	5.00	4.52	3.58
2007-08									8.58	9.95	4.89	3.08
2008-09	0.597								4.42	10.4	4.39	
2009-10										13.5	6.06	3.20
2010-11	1.03									2.49	7.71	5.50
2011-12									3.37	5.38	4.21	2.95
2012-13									4.52	5.45	3.80	
2013-14								1.61	4.93	5.45	3.54	2.33
2014-15	0.593								4.69	5.42	3.19	0.929
2015-16									9.35	8.08	4.48	2.27
2016-17												4.72
2017-18	2.47								8.87	8.83	5.7	1.97
2018-19	1.82											4.73
2019-20	2.29								6.74	5.01	4.04	
Mean	1.8	1.1	0.8	0.66	0.61	0.73	1.4	3.3	7.5	9.1	5.7	3.8

Source: USGS 2021m
[1] At USGS Station No. 10268225
[2] cubic feet per second

Another non-recording gage, USGS No. 10268227 (McGee Creek below Diversion Dam) is located below the McGee Creek Diversion. Published discharge values are calculated from observations of stage by field-staff. The USGS jointly managed the site with SCE since 1999. Monthly mean flow statistics are not publicly available for this gage (Table).

Table 8.4-15. Mean Flow for Birch-McGee Diversion to Bishop Creek Power Plant No. 2[1]

Water Year	Monthly Mean Flow[2]											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1989-90	7.65	3.98	4.35	4.11	4.26	4.59	5.07	5.80	8.55	12.1	8.36	8.50
1990-91	4.65	4.19	3.70	3.61	3.48	3.55	4.23	5.36	11.9	15.5	10.0	8.72
1991-92	5.91	4.61	4.14	4.02	3.92	4.13	5.09	6.65	11.2	9.81	8.35	5.62
1992-93	6.48	4.16	3.99	3.93	3.77	4.35	5.53	8.89	17.2	31.7	23.5	19.7
1993-94	9.95	10.9	8.71	8.60	10.9	10.8	11.5	8.50	16.0	15.6	9.12	6.10
1994-95	2.89	2.70	2.57	2.48	2.47	2.45	2.43	2.76	4.99	6.83	4.82	2.98
1995-96	2.87	3.51	4.15	4.55	5.32	4.86	4.89	9.65	28.3	31.6	6.29	5.74
1996-97												
1997-98	8.60	6.39	5.79	5.31	5.01	4.86	4.83	4.70	8.1	34.8	33.5	22.8
1998-99	7.71	6.62	6.40	5.81	5.27	4.96	4.73	6.59	15.6	20.3	15.4	9.81
1999-00	5.83	6.66	4.35	4.15	4.01	3.93	3.79	8.93	26.3	22.0	15.2	9.56
2000-01	6.00	3.50	3.87	3.70	3.56	3.65	3.56	12.7	18.7	19.2	11.8	8.27
2001-02	5.46	2.50	3.78	3.54	3.41	3.17	3.37	5.79	19.2	20.0	9.81	3.72
2002-03	0.367	0.613	2.69	3.39	3.23	3.25	3.13	4.93	24.6	20.9	11.0	7.90
2003-04	5.40	3.84	2.88	2.62	2.53	2.75	1.91	6.54	16.9	19.0	10.2	5.83
2004-05	6.60	3.73	2.95	3.31	0.389	2.21	1.99	3.88	10.6	19.5	21.8	9.62
2005-06	6.47	5.15	4.77	4.30	4.05	3.83	4.02	7.07	16.1	35.4	21.8	10.6
2006-07	7.02	5.23	4.09	3.71	0.554	0.000	0.000	0.600	10.1	9.05	10.5	8.37
2007-08	3.98	0.057	0.000	0.000	0.000	0.000	1.31	5.59	18.7	22.6	12.1	7.62

Water Year	Monthly Mean Flow[2]											
	Oct	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
2008-09	4.44	1.41	3.08	3.01	2.86	2.68	2.46	5.27	12.3	18.6	12.3	7.26
2009-10										29.5	15.0	8.69
2010-11	5.62	4.38	3.28	3.39	3.44	3.39	3.82	1.55	11.4	19.7	24.2	13.5
2011-12	9.22	5.37	3.72	3.75	3.59	3.42	3.19	4.93	8.48	11.4	9.38	6.66
2012-13	4.29	3.31	3.21	2.96	2.70	2.62	2.35	3.34	9.40	10.3	7.68	0.583
2013-14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.05	9.85	11.1	7.69	5.50
2014-15	3.33	2.79	2.61	2.44	2.36	2.24	2.09	2.68	7.66	8.51	5.86	3.43
2015-16	2.90	2.58	2.48	2.41	2.23	2.30	2.27	4.23	15.1	15.3	9.99	5.99
2016-17	3.20	3.22	3.14	3.05	2.98	3.05	3.49					15.3
2017-18	9.35	6.98	6.25	5.6	5.02	4.82	4.78	8.7	22.6	18.2	14.5	7.17
2018-19	5.98	5.67	4.4	4.14	3.93	3.73	4.28	4.24	6.76	12.8	22.3	13.2
2019-20	7.26	6.23	5.48	4.9	4.41	4.27	4.26	7.45	15.8	12.5	10.1	5.98
Mean	5.5	4.1	3.8	3.7	3.4	3.4	3.6	5.8	14	18	13	8.5

Source: USGS 2021n
[1] At USGS Station No. 10270900
[2] cubic feet per second

8.4.3 Monthly Flow Duration Curves

Because the Bishop Creek Project utilizes storage that is managed year-round, the critical stream flow for determining critical capacity is not applicable here; rather, the lowest hydraulic capacity of any single development was used in determining a dependable capacity of 28.922 MW. Flow duration curves for the Bishop Creek Project are provided in Appendix C (Volume 2).

8.4.4 Existing Instream Flow Uses

The operating power plants, in order of decreasing elevation, are numbered 2 through 6 and utilize the entire available head from an elevation of 8099 feet (the intake of Power Plant No. 2) down to 4512 feet (the nozzle of Power Plant No. 6). A common pool forms the after bay of each upstream power plant and the forebay of the next power plant downstream.

There are two major storage reservoirs in the Bishop Creek watershed, Lake Sabrina and South Lake. Other reservoirs are small, and their storage is insignificant. Lake Sabrina Reservoir on the Middle Fork has a usable storage capacity of 7,350 acre-feet, a water surface area of 184 acres, and a surface elevation of 9131.62 feet when full. The South Lake Dam has a usable storage capacity of 12,883-acre-feet, a surface area of 173 acres, and surface elevation of 9751.3 feet when full.

The bedrock of the ridge upon which the South Lake dam is constructed lies at a higher level than the bottom of the former natural lake. To realize the benefit of the storage below the old lake surface, a tunnel was constructed through bedrock below the lower point in the dam's foundation. The upper portal of this outlet tunnel extends into the lake approximately 1380-feet upstream of the dam. The outlet is approximately 600-feet downstream of the dam. The total length of the tunnel is approximately 1980 feet and has a drop of 11.4 feet from the upper to the lower end. With a full reservoir, the upper gate of the tunnel sustains a head of 130 feet.

Green Creek diversion diverts the flow in Green Creek from just below Bluff Lake into South Lake. This diversion is only activated if the combined flow from Lake Sabrina and North Fork of Bishop Creek is not sufficient to operate the power plants and South Lake will not concurrently spill. These conditions occur in approximately one out of three years.

Water released from these two reservoirs can be utilized through Power Plant No. 2 through No. 6. They are operated primarily for power generation within the court decree restraints of prior water rights held by downstream irrigation interests (Chandler Decree 1922).

Power Plant No. 2 receives its water supply primarily from Bishop Creek. The supply from the South Fork is diverted by means of a small concrete diversion structure located on the South Fork. The water is carried through a steel pipeline, 8163-feet in length, to a regulating reservoir, having a 78 acre-feet capacity on the Middle Fork, known as Intake No. 2.

In addition to Bishop Creek water, Power Plant No. 2 receives a supplementary water supply from Birch Creek and McGee Creek, the next two streams northwest of Bishop Creek watershed. From Birch Creek, water is carried through a 9513-foot-long pipe and discharged directly into the penstock of Power Plant No. 2 where water is discharged through the impulse turbines directly into the intake of Power Plant No. 3.

Power Plant No. 3 is built on the northwest bank of Bishop Creek with its main axis parallel to the stream. The water from the turbines is discharged through arched raceways into the Power Plant No. 4 intake diversion pond. The conduit from Intake No. 4 Dam consists of a 6242-foot-long, 60-inch-diameter steel pipe with air vents every 100 feet. At the lower end, this pipe bifurcates into two lines.

Two pressure mains run by divergent routes from the bifurcation to the two impulse turbines at the powerhouse. The first line has a total length of 5314 feet. The second is 5665 feet. Power Plant No. 4 discharges to the intake dam immediately below Power Plant No. 4 into the pond that is common to the Power Plant No. 4 tailrace. Coyote Creek, the only significant tributary within the diverted section of Bishop Creek, enters Bishop Creek between Intake No. 4 and Power Plant No. 4. The additional water from this creek is therefore available for use by Power Plant No. 5 and No. 6.

The intake reservoir for Power Plant No. 6 lies immediately below the point of discharge of Power Plant No. 5. The flowline from the dam curves gently along the bank of Bishop Creek. The first section is a 3000-foot-long, 60-inch-diameter, steel pipe, followed by a penstock consisting of a 4360-foot-long riveted steel pipe. The total length is 7360 feet from dam to powerhouse.

The primary use of the water within the Bishop Creek watershed is for power generation. The power plants within this Bishop Creek Project are operated at a level consistent with the available water supply. During periods of high streamflow, the power plants are operated at capacity level and during periods of low flow, water is used conservatively to assure a continuous water supply throughout the season.

A secondary use of water from the Bishop Creek watershed is for irrigation. Consistent with this use, a certain level of flow must be maintained below Power Plant No. 6 in compliance with the Chandler Decree, as presented in Table .

Table 8.4-16. Flow Requirements in Bishop Creek below Plant No. 6

Period	**Average Daily Flow Required** (cfs)
April 1-15, inclusive	44
April 16-30, inclusive	68
May 1-15, inclusive	87
May 16-31, inclusive	98
June-August	106
September 1-15, inclusive	76
September 16-30, inclusive	58

8.4.5 PRECIPITATION

SCE maintains precipitation gages in the Bishop Creek watershed at three locations: Intake No. 2, Lake Sabrina, and South Lake (Figure 8.4-3). Data collected from the gages indicate the months with the highest precipitation generally occur from November through March with the higher elevation gages averaging approximately 4 inches to 6 inches more precipitation than the lower elevation gages.

For the period of record (1959 – 2004), the precipitation gage at Intake No. 2 had an average precipitation of 11.99 inches per year and the most recent 13-year period (1991 – 2004) averaging 12.87 inches per year. The highest annual precipitation was 24.98 inches recorded during the 1982 to 1983 calendar year and the lowest annual precipitation was 5.12 inches recorded during the 1968 calendar year (WRCC 2022).

The precipitation gage at Lake Sabrina had an average precipitation of 14.91 inches per year over the 91-year operating period and the most recent 30-year period averaging 14.96 inches per year. The highest annual precipitation was 36.19 inches recorded during the 1937 to 1938 water year and the lowest annual precipitation was 6.95 inches recorded during the 1959 to 1960 water year (CDWR 2020).

The precipitation gage at South Lake had an average precipitation of 19.10 inches per year over the 91-year operating period and the most recent 30-year period averaging 18.43 inches per year. The highest annual precipitation was 39.10 inches recorded during the 2016 to 2017 water year and the lowest annual precipitation was 8.51 inches recorded during the 1976 to 1977 water year (CDWR 2020).

SCE operated snow survey points at six locations near the Bishop Creek watershed and the locations are depicted in Figure 8.4-5. Average water content ranged from 7 percent at North Lake (9300 feet msl) in January to 35 percent at Piute Pass (11,300 feet msl) in April. Snow accumulation averaged 25.8 inches at North Lake (9300 feet msl) in January to 91.3 inches at Piute Pass (11,300 feet msl) in April. In general, the highest water content and greatest snow accumulation at the various snow survey points were associated with above average precipitation measured for the area.

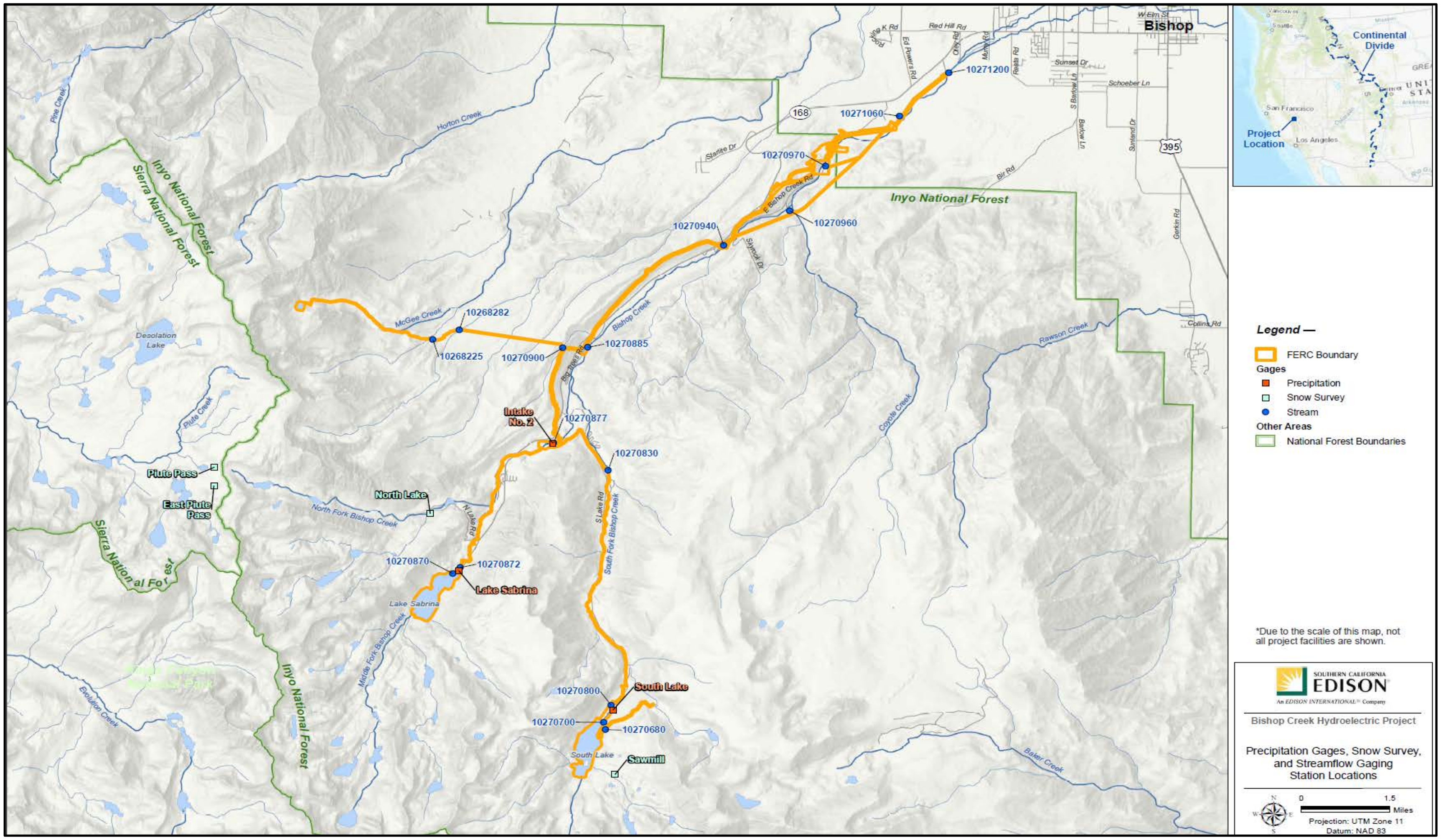

Figure 8.4-3. Precipitation Gages, Snow Survey, and Streamflow Gaging Station Locations.

8.4.5.1 Existing Water Rights

There has been very little development of the Bishop Creek drainage. More than one-half of the drainage is in the John Muir Wilderness and much of the remainder is the INF. Developed recreational areas are found only along Middle and South forks from Lake Sabrina and South Lake to the confluence of the forks and on North Fork at North Lake.

Before the completion of Lake Sabrina Dam in 1908 and South Lake Dam in 1911, the flows of Bishop Creek were uncontrolled. The dams provided storage and permitted diversion of Bishop Creek waters from a small regulating reservoir through a flowline and penstock to Bishop Creek Power Plant No. 2. Diversions were constructed on McGee and Birch creeks in approximately 1925 to divert waters to Bishop Creek Power Plant No. 2.

The Bishop Creek Project has no existing or proposed consumptive uses of water except for minor domestic use by employees at Project facilities. Although water is stored in upstream reservoirs for power generation at Bishop Creek Power Plants Nos. 2 through 6, there is no long-term net loss of water to downstream areas. Figure 8.4-4 presents a schematic of the flow regime for the Bishop Creek Project. Hydraulic capacity for each power plant is summarized in Section 5.2 – Existing Project Facilities (Table 5.2-1). Figure 8.4-5 shows locations of water rights diversions associated with the Bishop Creek Project. Table 8.4-17 lists all SCE and LADWP owned, active water rights in the area of the Bishop Watershed.

Table 8.4-17. Summary of Existing SCE and LADWP Owned-Water Rights in the Bishop Creek Watershed

Applicant ID	Owner	Source	Diversion Amount (cfs)	Storage Amount (gpd)	Type	Status
A00954	SCE	Birch Creek/Horse Creek*	12	--	Appropriative	Licensed
A00953	SCE	Birch Creek/Horse Creek*	12	--	Appropriative	Licensed
S007751	SCE	Birch Creek	35	--	Statement of Diversion and Use	Claimed
S007753	SCE	Bishop Creek	127	--	Statement of Diversion and Use	Claimed
S005258	LADWP	Bishop Creek	175	--	Statement of Diversion and Use	Claimed
S001713	LADWP	Bishop Creek	8	--	Statement of Diversion and Use	Claimed
S007754	SCE	Bishop Creek	145	--	Statement of Diversion and Use	Claimed
S007752	SCE	Bishop Creek	150	--	Statement of Diversion and Use	Claimed
S001711	LADWP	Bishop Creek	45	--	Statement of Diversion and Use	Claimed
S007755	SCE	Bishop Creek	142	--	Statement of Diversion and Use	Claimed
A004549	SCE	Green Lake Creek	--	1400	Appropriative	Licensed
A004548	SCE	Green Lake Creek	--	1400	Appropriative	Licensed
A001484	SCE	McGee Creek	17	--	Appropriative	Licensed

Applicant ID	Owner	Source	Diversion Amount (cfs)	Storage Amount (gpd)	Type	Status
A001485	SCE	McGee Creek	17	--	Appropriative	Licensed
S007762	SCE	McGee Creek	0	145	Statement of Diversion and Use	Inactive**
S007766	SCE	McGee Creek	25	0	Statement of Diversion and Use	Inactive**
S007776	SCE	Middle Fork Bishop Creek	--	7350	Statement of Diversion and Use	Claimed
S007759	SCE	Middle Fork Bishop Creek	150	121	Statement of Diversion and Use	Claimed
S007779	SCE	South Fork Bishop Creek	65	--	Statement of Diversion and Use	Claimed
S007782	SCE	South Fork Bishop Creek	13191	--	Statement of Diversion and Use	Claimed
S001723	LADWP	South Fork Bishop Creek	1	--	Statement of Diversion and Use	Claimed
A000102	LADWP	Unspecified	0.25	--	Appropriative	Licensed

Source: SWRCB 2019; Personal communication V.White, December 14, 2021

cfs – cubic feet per second

gpd – gallons per day

*The initial licenses for A00953 and A00954 both specified two points of diversion: Birch Creek East (later named Horse Creek). Birch Creek West is currently known as the Birch-McGee Diversion. McGee Creek is diverted over Birch Creek, and then both points flow down through the natural Birch Creek channel to the Birch-McGee Diversion. Water diverted from McGee Creek is reported identically under A00953 and A00954, as both are post-1914 claims.

**S007762 is associated with Longley Lake, while S007766 is associated with the Birch-McGee Diversion.

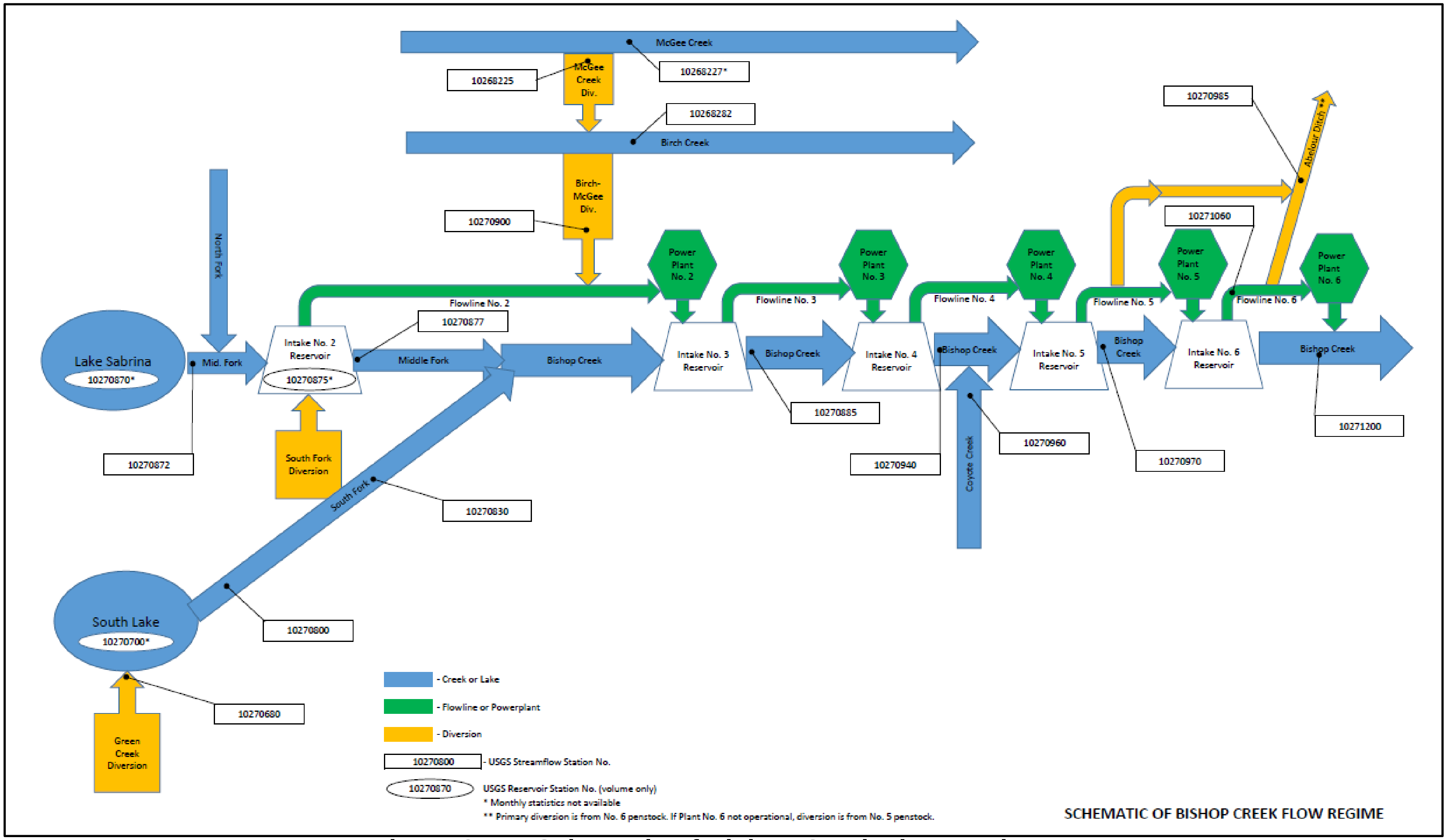

Figure 8.4-4. Schematic of Bishop Creek Flow Regime.

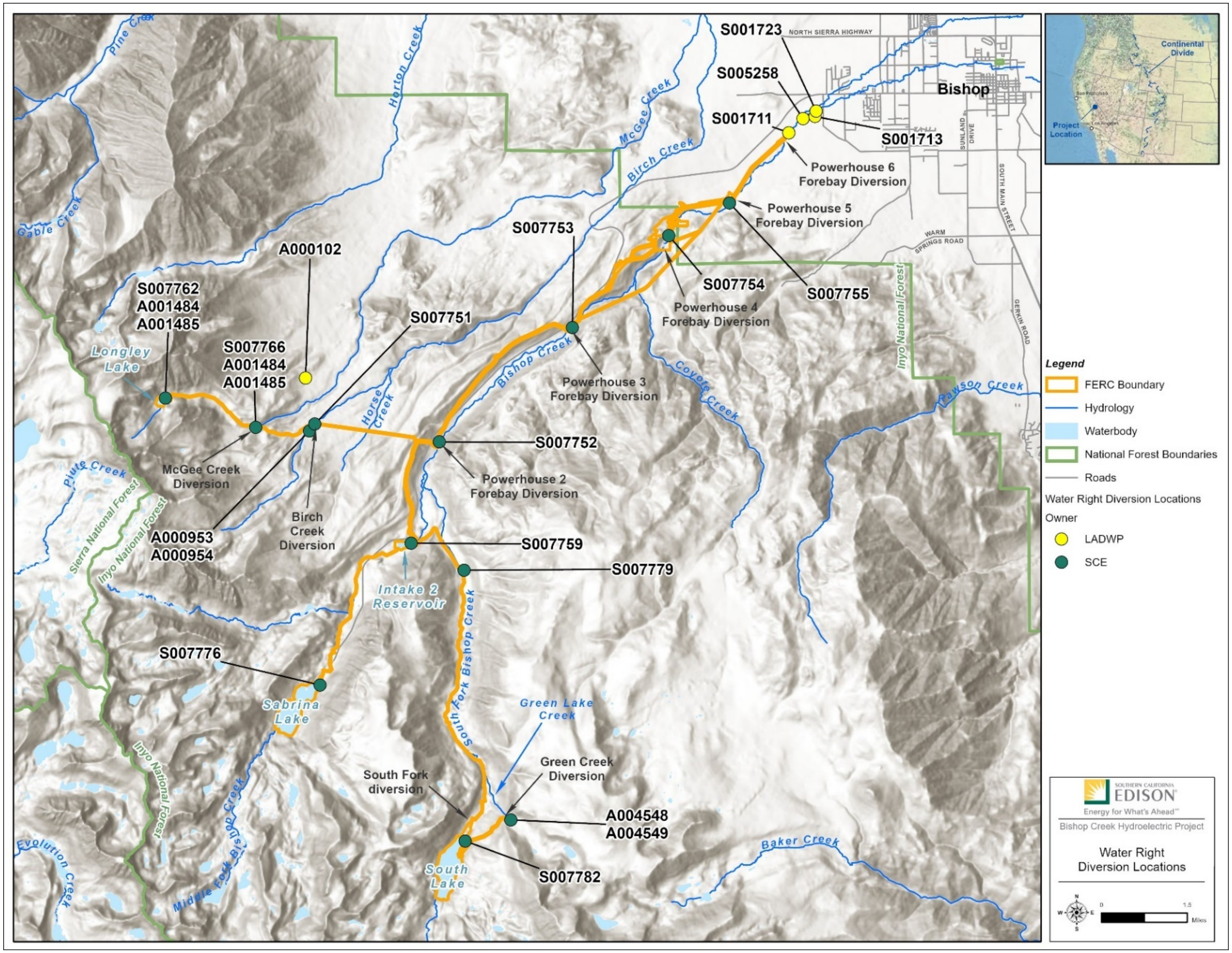

Figure 8.4-5. Water Right Diversion Locations.

8.4.6 Morphometric Data for Existing Reservoirs

Sabrina Dam is located at the north end of Lake Sabrina on the Middle Fork of Bishop Creek at an elevation of 9132.62 feet at spillway crest. The surface area of the lake varies from a maximum of 194 acres with a depth of 78 feet to a minimum of 18 acres with a depth of 15 feet. This lake is one of two main Bishop Creek Project storage reservoirs. The USGS maintains a gage on Lake Sabrina and reports daily volume of water of the lake based on a capacity table dated August 12, 1981. The usable capacity is 7350 acre-feet, based on the invert elevation of 9068.42 feet.

South Lake Dam is located on the South Fork of Bishop Creek at elevation 9751.31 feet at the spillway crest and is the other major Bishop Creek Project storage reservoir. The surface area of the lake varies from a maximum of 173 acres with a depth of 130 feet to a minimum of 45 acres with a depth of 45 feet. South Lake is similar to Lake Sabrina as numerous lakes and streams feed into the southern end. The USGS maintains a gage on South Lake and reports daily volume of water of the lake based on a capacity table dated August 5, 1981. Usable capacity is 12,883 acre-feet, based on the invert of outlet tunnel elevation of 9621.20 feet, and the spillway crest of 9751.31 feet.

8.4.7 Gradient of Downstream Reaches

In 1986, SCE conducted instream flow and fisheries study in both Bishop Creek and the Birch and McGee creek watersheds. As part of that study, various stream reaches were identified and are presented in Figure 8.4-6. In addition, gradients were calculated and are presented in Table 8.4-18 and discussed below.

The Bishop Creek gradient ranged from 173 feet per mile (3.27 percent slope) at Reach 1 (at Power Plant No. 6) to over 500 feet per mile (greater than10 percent) in the upper reaches of South Fork of Bishop Creek. The steepest portions generally were in the upper reaches, however portions of South Fork (Reaches 8 and 10) had gradients similar to what was observed down near Power Plant No. 6.

The Birch Creek gradient ranged from 300-feet per mile (5.69 percent slope) at the Lower Reach to 431-feet per mile (greater than 10 percent) in the Upper Reach of Birch Creek. The McGee Creek watershed ranged from 258-feet per mile (4.89 percent slope) at the Lower Reach to 539-feet per mile (10.21 percent) in the Upper Reach of McGee Creek.

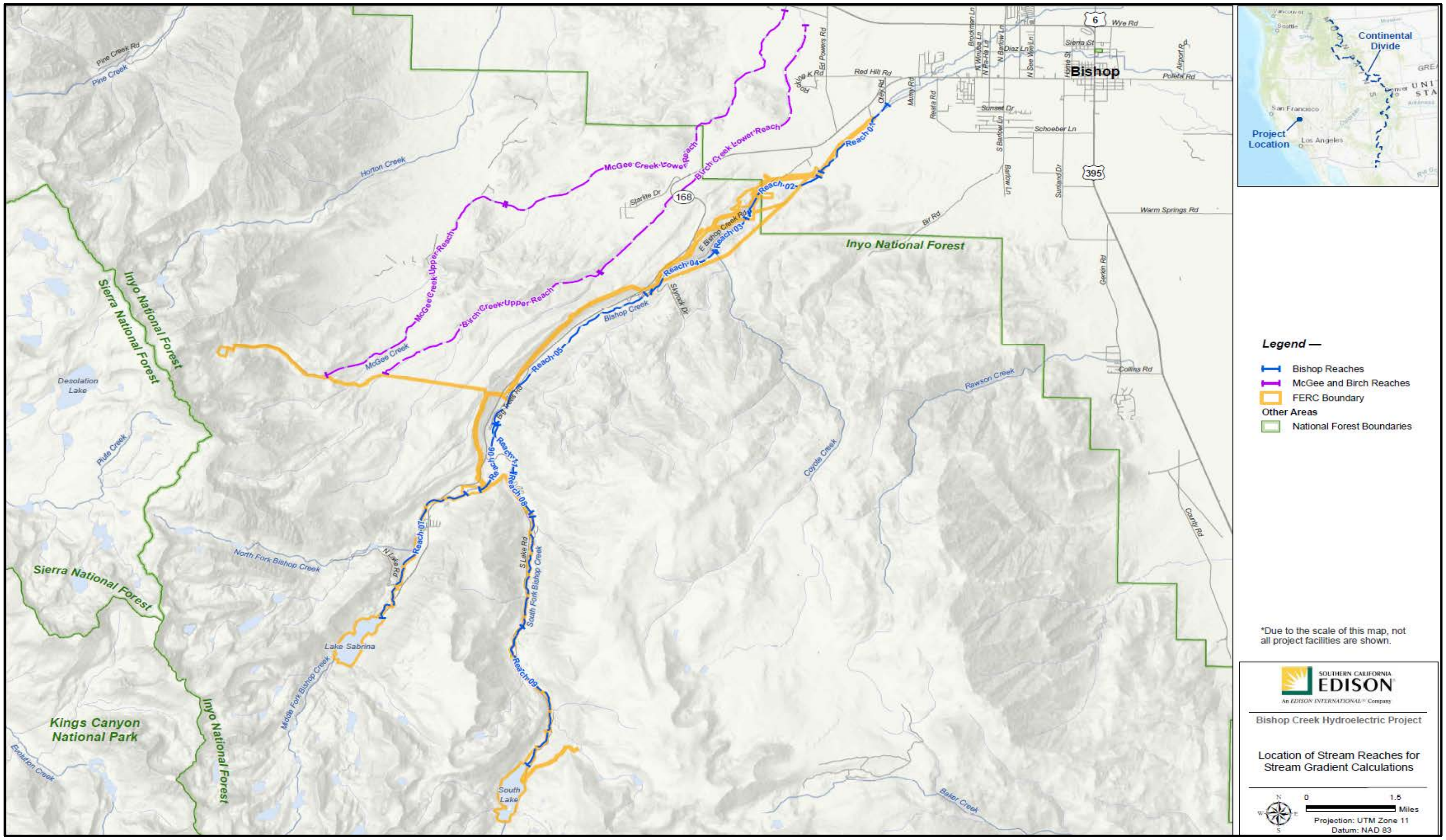

Figure 8.4-6. Location of Stream Reaches for Stream Gradient Calculations.

Table 8.4-18. Approximate Stream Length and Gradient for Various Stream Reaches in Bishop Creek, McGee Creek, and Birch Creek Watersheds

Drainage Name	Reach (a)	Length of Reach (feet) [b]		Elevation of Reach [c]		Stream Gradient	
		(in feet)	(in miles)	Top of Reach (feet msl) Bottom of Reach (feet msl)	Elevation Change (feet)	(feet/mile)	%
Bishop Creek	Reach 01	9,778	1.85	4,780	320	173	3.27%
	Reach 02	8,546	1.62	5,200	420	259	4.91%
	Reach 03	4,636	0.88	5,520	320	364	6.90%
	Reach 04	7,577	1.44	6,340	820	571	10.82
	Reach 05	19,971	3.78	7,420	1,080	286	5.41%
Middle Fork Bishop Creek	Reach 06	7,717	1.46	8,080	660	452	8.55%
	Reach 07	17,327	3.28	9,120	1,020	311	5.89%
South Fork Bishop Creek	Reach 08	4,516	0.86	8,220	160	187	3.54%
	Reach 09	27,939	5.29	9,720	1,500	283	5.37%
	Reach 10	5,205	0.99	9,000	200	203	3.84%
	Reach 11	5,748	1.09	8,060	640	588	11.13
Birch Creek	Lower Reach	33,741	6.39	6,360	1,920	300	5.69%
	Upper Reach	23,517	4.45	8,280	1,920	431	8.16%
McGee Creek	Lower Reach	38,431	7.28	6,320	1,880	258	4.89%
	Upper Reach	27,420	5.19	9,120	2,800	539	10.21

Source: SCE 1986a, 1986b

Notes:
b – Extrapolated from ArcGIS calculation tool of SCE 1986a and 1986b.
c – Extrapolated from USGS topographic contour map.

8.4.8 Federally Approved Water Quality Standards

The state of California has responsibility for maintaining water quality standards through the federal CWA. The SWRCB and Lahontan Regional Water Quality Control Board (LRWQCB) are responsible for the protection of beneficial uses of water resources within its jurisdiction and use planning, permitting, and enforcement authorities to meet this responsibility. Every water body within the LRWQCB jurisdiction is designated a set of beneficial uses that are protected by appropriate water quality objectives as described in the Lahontan Region Basin Plan ([Basin Plan], LRWQCB 1995).

For smaller tributary streams in which beneficial uses are not specifically designated, they are granted with the same beneficial uses as the streams, lakes, or reservoirs to which they are a tributary. Table 8.4-19 lists the water bodies to which this Bishop Creek Project drains and their beneficial use designations.

The Basin Plan defines the beneficial use abbreviations as the following:

- **Municipal and Domestic Supply (MUN) –** Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- **Agricultural Supply (AGR) –** Beneficial uses of waters used for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, and support of vegetation for range grazing.
- **Industrial Process Supply (PRO)** – Uses of water for industrial activities that depend primarily on water quality.
- **Industrial Service Supply (IND) –** Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, geothermal energy production, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
- **Ground Water Recharge (GWR)** - Beneficial uses of waters used for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- **Freshwater Replenishment (FRSH) -** Beneficial uses of waters used for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
- **Hydropower Generation (POW) –** Uses of water for hydroelectric power generation.
- **Water Contact Recreation (REC-1) –** Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin

and scuba diving, surfing, whitewater activities, fishing, or use of natural hot springs.

- **Non-Contact Water Recreation (REC-2) –** Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

- **Commercial and Sportfishing (COMM) -** Beneficial uses of waters used for commercial or recreational collection of fish or other organisms including, but not limited to, uses involving organisms intended for human consumption.

- **Cold Freshwater Habitat (COLD) –** Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

- **Wildlife Habitat (WILD)** – Uses of water that support terrestrial or wetland ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

- **Preservation of Biological Habitats of Special Significance (BIOL)** - Beneficial uses of waters that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, and Areas of Special Biological Significance (ASBS), where the preservation and enhancement of natural resources requires special protection.

- **Spawning, Reproduction, and/or Early Development (SPWN)** – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

The water quality objectives include both numeric and narrative standards for surface water that are based on criteria that protect both human health and aquatic life. If water quality is maintained at levels consistent with these objectives, beneficial uses are considered protected. Applicable water quality objectives and standards in the Basin Plan are provided in Table 8.4-20 and Table 8.4-21.

Table 8.4-19. Project Water Body Beneficial Use Designations

SURFACE WATER BODY	Beneficial Use																					
	MUN	AGR	PRO	IND	GWR	FRSH	NAV	POW	REC1	REC-2	COMM	AQUA	WARM	COLD	SAL	WILD	BIOL	RARE	MIGR	SPWN	WQE	FLD
	Municipal and Domestic Supply	Agricultural Supply	Industrial Process Supply	Industrial Service Supply	Groundwater Recharge	Freshwater Replenishment	Navigation	Hydropower Gen.	Water Contact Recreation	Non-Contact Water Recreation	Commercial and Sport Fishing	Aquaculture	Warm Freshwater Habitat	Cold Freshwater Habitat	Inland Saline Water Habitat	Wildlife Habitat	Special Biological Habitats	Rare, Threatened & Endangered Species	Migration of Aquatic Organisms	Spawning, Reproduction & Dev.	Water Quality Enhancement	Flood Peak Attenuation/Flood
Upper Owens Hydrologic Area Hydrologic Unit 603.20																						
McGee Creek	X	X			X	X		X	X	X	X			X		X	X			X		
Bishop Creek (above intakes)	X	X						X	X	X	X			X		X				X		
Intake No. 2 Reservoir	X							X	X	X	X			X		X						
Bishop Creek (below intakes)	X							X	X	X	X			X		X				X		
Bishop Creek (below last Powerhouse)	X	X		X	X				X	X	X			X		X				X		

Source: SCE 2021

Table 8.4-20. Water Quality Objectives in the Upper Owens River Hydrologic Unit

Constituent/ Parameter	Water Quality Objective
Ammonia	Shall not exceed the values in Tables 3-1 to 3-4 in LRWQCB Basin Plan.
Bacteria	The fecal coliform concentration during any 30-day period shall not exceed a log mean of 20/100 milliliters (ml), nor shall more than 10 percent of all samples collected during any 30-day period exceed 40/100 ml.
Biostimulatory Substances	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect the water for beneficial uses.
Chemical Constituents	Waters designated as MUN shall not contain concentrations of chemical constituents exceeding the maximum contaminant level (MCL) or secondary maximum contaminant level (SMCL) based upon drinking water standards specified in Title 22.
Chlorine, total residual	For the protection of aquatic life, total chlorine residual shall not exceed either a median value of 0.002 mg/L or a maximum value of 0.003 mg/L. Median values shall be based on daily measurements taken within any 6-month period.
Color	Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.
Dissolved Oxygen (DO)	The DO concentration, as percent saturation, shall not be depressed by more than 10 percent, nor shall the minimum DO concentration be less than 80 percent of saturation. For waters with the beneficial uses of COLD, COLD with SPWN, WARM, and WARM with SPWN, the minimum DO concentration shall not be less than that specified in Table 3-6 of the LRWQCB Basin Plan.
Floating Material	Water shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Oil & Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water that cause nuisance, or that otherwise adversely affect the water for beneficial uses.
pH	In fresh waters with designated beneficial uses of COLD or WARM, changes in normal ambient pH levels shall not exceed 0.5 pH units. For all other waters of the region, the pH shall not be depressed below 6.5 nor raised above 8.5.
Radioactivity	Radionuclides shall not be present in concentrations that are deleterious to human, plant, animal, or aquatic life or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Settleable Material	Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.

Constituent/ Parameter	Water Quality Objective
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Tastes and Odors	Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin that cause nuisance, or that adversely affect the water for beneficial uses.
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the RWQCB that such alteration in temperature does not adversely affect beneficial uses.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses. Increases in turbidity shall not exceed natural levels by more than 10 percent.

Source: SCE 2020

Table 8.4-21. Water Quality Objectives for Certain Project Water Bodies

Surface Waters	**Objective (mg/L)** [a,b]						
	TDS	**Cl**	**F**	**B**	**NO_3-N**	**Total N**	**PO_4**
Lake Sabrina	<u>10</u> 17	<u>2.0</u> 3.0	<u>0.10</u> 0.10	<u>0.05</u> 0.05	<u>0.2</u> 0.3	<u>0.3</u> 0.6	<u>0.03</u> 0.05
South Lake	<u>12</u> 20	<u>3.7</u> 4.3	<u>0.10</u> 0.10	<u>0.02</u> 0.02	<u>0.1</u> 0.1	<u>0.1</u> 0.4	<u>0.03</u> 0.04
Bishop Creek (Intake No. 2)	<u>27</u> 29	<u>1.9</u> 3.0	<u>0.15</u> 0.15	<u>0.02</u> 0.02	<u>0.1</u> 0.2	<u>0.1</u> 0.4	<u>0.05</u> 0.09

Source: LRWQB 1995

a Annual average value/90th percentile value (<u>underlined</u>).

b Objectives are in mg/L and are defined as follows:

B = Boron

Cl = Chloride

F = Fluoride

N = Nitrogen, Total

NO3-N = Nitrate as Nitrogen

PO4 = Orthophosphate, dissolved

TDS = Total Dissolved Solids (Total Filterable Residue

8.4.9 Water Quality

The information presented in this section provides an overview of the existing physical and chemical water quality conditions in the Bishop Creek Project vicinity. Water quality information presented in this section was derived from existing published reports and publicly available databases.

8.4.9.1 Previous Studies

Existing information sources confirmed that the physical and water chemistry conditions in the streams and rivers associated with the Bishop Creek Project (bypass reaches) are of high quality and conform to regulatory water quality objectives and standards. No persistent, widespread water quality issues were identified. There is no agriculture or water treatment plants that discharge into the bypass reaches. Many studies were conducted in the Bishop Creek Project area by various entities including SCE, USFS and the USGS. The following discussion is a summary of the findings of previously conducted studies.

SCE Monitoring Data

In 1974, ESE in cooperation with the University of California at Los Angeles conducted an environmental baseline study of the water quality of Bishop Creek. The report concluded that the water quality of Bishop Creek was excellent and displayed the following characteristics:

- Total dissolved solids remained very low throughout the summer, less than 30 mg/l
- Calcium (Ca) was the predominant cation in all sampled waters and surface water composition reflected the general geology of the drainage basin
- Nitrate and phosphate levels were low, generally less than 0.10 mg/1 and 0.05 mg/L, respectively

Water temperatures generally increased downstream; the report further stated that calcium was the dominant cation and that North Fork had higher values than other drainages and appeared to be related to the geology (marble roof pendants) that is found in the upper reaches of North Fork. In addition, the report noted that as flow decreased in Bishop Creek increases in various ions were noted and was attributed to groundwater making up a larger percentage of the baseflow of the stream. The groundwater generally having more contact time with the underlying bedrock and accordingly higher concentrations of major ions (ESE 1974).

The ESE report (1975) determined that similar water characteristics that were reported from previous investigations with increasing dissolved constituents coincides with decreasing elevation. The dominant anion was bicarbonate, and the dominant cations were calcium and sodium. In addition, the water quality of Bishop Creek at the furthest downstream site (below Power Plant No. 6) had lower concentrations of alkalinity and dissolved constituents. The ESE Report (1975) stated that the likely reason for the decrease was the routing of water for power generation purposes.

Table 8.4-22 provides a summary of the water quality characteristics for Bishop Creek, as reported in 1975. In 1985, SCE investigated the South Fork, McGee Creek, and Birch Creek to characterize the water quality of the adjacent drainages and additional points on Bishop Creek. This data is summarized in Table 8.4-23 and Table 8.4-24. Figure 8.4-7 presents the locations where water quality samples were collected.

Minor amounts of boron, barium, aluminum, iron, and manganese were found in the various drainages with the highest levels generally found in Bishop Creek below the confluence with South Fork.

Table 8.4-22. Physical and Chemical Characteristics of North and Middle Fork of Bishop Creek June - November 1974

	Sample Location										
	S1	S2	S2A	S3	S4	S6	S6A	S7	S8	S19 Bishop Creek @ Hwy 395 (*)	
Parameter	Range	Range	Range	Range	Range	Range	Range	Range	Range	Spring	Fall
Calcium (mg/L)	1.7-3.7	2.3-4.9	1.9-2.9	1.9-3.2	2.2-2.6	2.3-3.0	2.3-3.3	2.1-2.7	2.1-3.0	9.6	8.8
Magnesium (mg/L)	0.1-0.16	0.13-0.18	0.12-0.16	0.14-0.22	0.17-0.19	0.18-0.22	0.18-0.23	0.13-0.22	0.13-0.16	0.7	0.5
Sodium (mg/L)	0.4-0.8	0.8-1.1	0.6-1.0	0.5-1.0	0.6-0.8	0.80.8-1.1	0.7-1.1	0.8-1.2	0.6-0.7	4.5	3.4
Nitrate as N (mg/L)	0.03-0.11	0.08-0.13	0.05-0.12	0.05-0.1	0.05-0.12	0.05-0.13	0.06-0.12	0.06-0.12	0.06-0.1	0.3	0.8
Phosphate as P (mg/L)	0.03-0.04	0.02-0.05	0.02-0.05	0.02-0.04	0.02-0.05	0.02-0.03	0.01-0.03	0.01-0.04	0.01-0.03	--	--
Total Dissolved Solids (mg/L)	6-27	8-26	7-20	8-21	9-16	11-21	20	11-21	8-10	--	--
Water Temperature (deg °C)	10.0-11.5	8.5-11.0	10.0-13.5	9.0-13.5	10.0-14.0	10.0-15.0	12.5-14.5	11.0-15.0	9.9-15.0	12.5	8.5
pH (units)	5.5-7.5	5.0-7.1	5.0-8.8	5.0-7.4	5.0-6.8	5.0-8.2	5.5-7.2	5.0-8.4	5.0-7.3	7.5	7.29
Diss. Oxygen (mg/L)	6.6-8.1	6.7-9.4	6.8-9.1	6.8-8.8	6.8-7.5	6.4-8.6	6.3-7.7	7.46.6-8.1	6.2-7.8	9.2	9.3

(*) Spring: May 1974; Fall: November 1974
(--) indicates analysis not performed

Source: ESE 1974

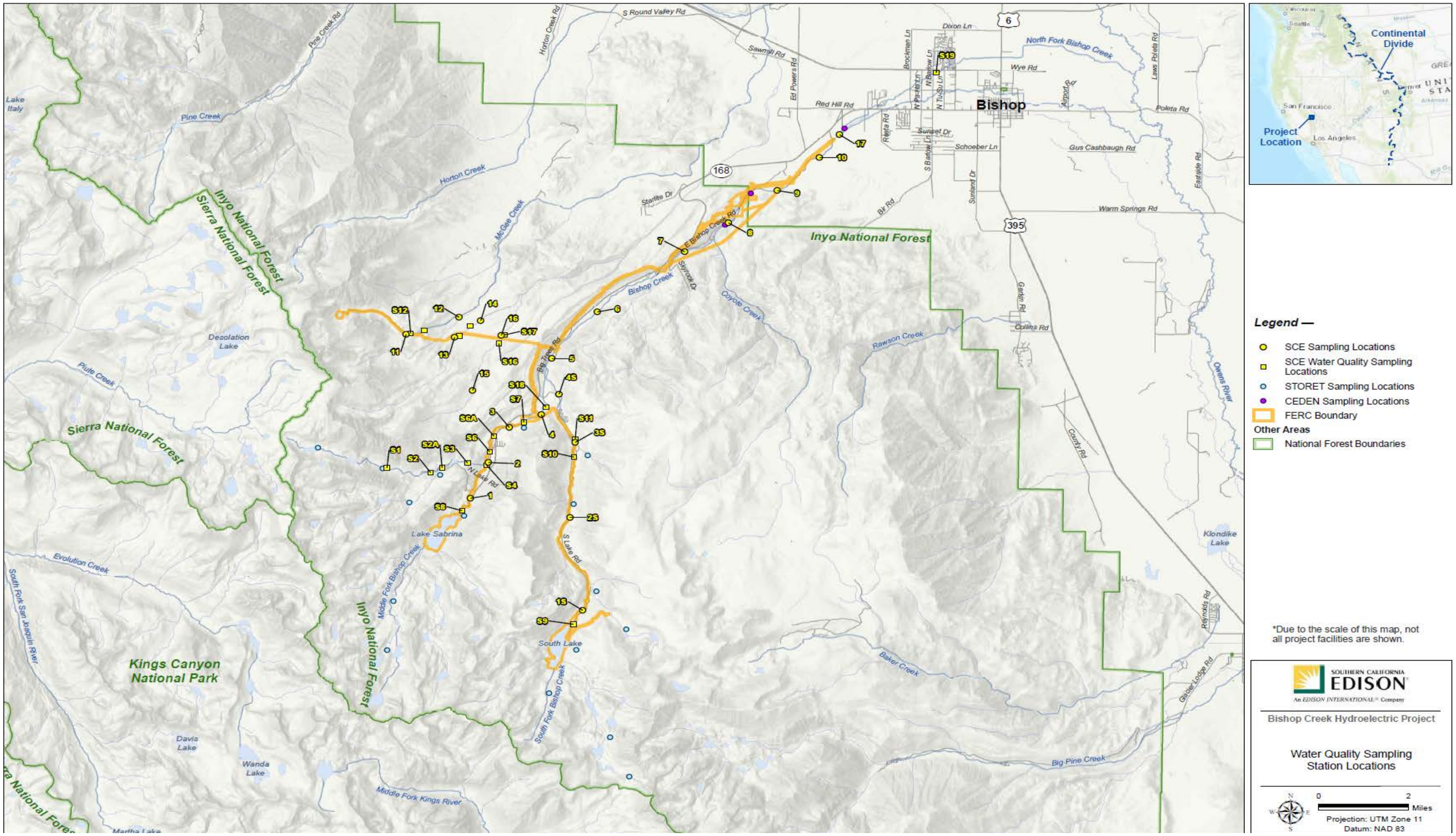

Figure 8.4-7. Water Quality Sampling Station Locations.

Table 8.4-23. Physical and Chemical Characteristics of South Fork of Bishop Creek(B), McGee Creek, and Birch Creek

Parameter	Watershed/Sample Location Number									
	South Fork of Bishop Creek			McGee Creek		Birch Creek				Middle Fork
	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18
Calcium (mg/L)	2.61	14.03	13.23	1.20	1.40	**	15.63	6.81	5.01	6.61
Magnesium (mg/L)	0.24	1.22	1.22	0.10	0.10	**	1.46	0.24	0.24	0.73
Sodium (mg/L)	0.46	0.92	0.69	0.23	0.23	**	0.92	0.46	0.46	0.46
Potassium (mg/L)	1.56	7.04	6.65	0.78	2.35	**	3.13	4.30	2.74	2.74
Nitrate as N (mg/L)	0.03	0.05	0.02	0.06	0.06	**	0.02	0.1	0.06	0.03
Sulfate as S (mg/L)	0.49	7.18	6.27	0.20	0.19	**	1.83	1.62	0.89	1.96
Acid Neutralizing Capacity (µeq/L)	152	707	684	72.4	80.8	**	1023	409	283	384
Water Temperature (deg °C)	9.6	10.1	9.2	8.2	10.0	**	8.2	7.8	8.8	9.4
pH (units)	7.26	7.77	7.88	7.05	7.11	**	7.80	7.69	7.58	7.55
Diss. Oxygen (mg/L)	8.9	8.1	8.3	--	--	**	--	--	--	--
Samples collected September 1985. (--) indicates analysis not performed. (**) indicates sample not taken due to dry creek.										

Source: SCE 1986c

Table 8.4-24. Physical and Chemical Characteristics of Middle and South Fork Bishop [a,b], McGee, and Birch Creeks May 1986- Dec 1987

Parameter	Watershed/Sample Locations (c)					
	Middle Fork of Bishop Creek	**South Fork of Bishop Creek**	**Bishop Creek Below South Fork**	**McGee Creek**	**North Fork of Birch Creek**	**South Fork of Birch Creek**
	1, 2, 3, 4	**1S, 2S, 3S, 4S**	**5, 6, 7, 8, 9, 10, 17**	**11, 12**	**13, 14**	**15, 16**
Calcium (mg/L)	1.3-10.0	2.5-47.3	4.1-20	2.58-10.3	5.5-13.9	13.8-15.3
Magnesium (mg/L)	0.1-0.9	0.3-5.7	0.4-4.9	0.20-0.77	0.3-0.5	1.34-1.59
Sodium (mg/L)	0.3-2.7	0.7-4.8	1.2-16.7	1.00-2.77	1.8-2.5	1.93-2.85
Potassium (mg/L)	0.04-1.0	0.4-3.3	0.1-2.0	0.50-1.67	0.6-1.3	1.38-1.56
ANC (μeq/L) (d)	122-447	146-2,532	235-1,537	153-651	321-789	893-1,006
Chloride (mg/L)	0.1-0.5	0.2-1.0	0.2-5.6	0.12-0.28	0.2-0.3	0.23-0.25
Nitrate (mg/L)	ND(e)-1.1	ND-0.8	ND-1.2	0.55-0.59	ND-0.5	ND
Sulfate (mg/L)	0.1-13.3	1.3-23.2	1.7-13.0	1.16-2.76	2.9-3.5	1.78-2.25
Silica (mg/L)	1.5-9.1	2.52-13.9	5.65-22.7	NS (f)	9.65-11.4	16.63-19.58
Boron (mg/L)	ND-0.01	ND-0.02	ND-0.04	NS	ND	ND
Barium (mg/L)	ND	ND-0.019	ND-0.054	NS	ND-0.003	0.001-0.005
Aluminum (mg/L)	ND-0.07	ND-0.09	ND-0.60	NS	ND-0.16	ND-0.15
Iron (mg/L)	ND-0.83	ND-0.19	ND-0.74	NS	ND-0.002	0.02-0.04
Manganese (mg/L)	ND-0.042	ND-0.035	ND-0.028	NS	ND	ND-0.002

Source: Lund undated

b - Values presented are estimated. Original values were reported in µmoles/L (UCR, 1988) and converted to mg/L.
c - ANC=Acid Neutralizing Capacity.
d - ND=Not detected (no detection limit provided).
e - NS=Not sampled.

UNIVERSITY OF CALIFORNIA RIVERSIDE WATER QUALITY INVESTIGATIONS

In 1986, the University of California at Riverside conducted a water quality investigation of Bishop Creek and selected eastern Sierra Nevada lakes for SCE. The following discussion presents the results of that investigation.

BISHOP CREEK

As part of the California's Surface Water Ambient Monitoring Program (SWAMP) for perennial streams, the California SWRCB undertook a water quality monitoring program on Bishop Creek from 2013 to 2016. The results of the study are summarized in Table 8.4-25.

The water quality was similar to that observed in previous studies with calcium and sodium the dominant cations. Total dissolved solids (TDSs) was low, ranging from 25 to 66 mg/L, but averaged above the Basin Plan value of 27 mg/L above Intake No. 2. Water temperature was generally less than 62.6ºF. Two biological parameters detected were fecal coliform and *Escherichia coli* (E coli.) and ranged from 1 to 66 colony forming units (cfu) per100 ml and 1 cfu to 61 cfu per 100 ml, respectively; exceeding the basin standard of 20 cfu/100 ml for fecal coliform.

Samples collected over the 2-year period of 2015 and 2016 indicated non-detectable values for fecal coliform or *E. coli* for Bishop Creek (total of three samples) at the USFS boundary. Studies conducted by the LRWQCB for Bishop Creek concluded that the impaired portion of Bishop Creek was located below Power Plant No. 6 and was likely the result of cattle grazing in or near Bishop Creek and potentially leaking sanitary sewer systems in lower Bishop Creek (Knapp and Craig 2016).

SOUTH LAKE AND LAKE SABRINA

Like most Sierra reservoirs, South Lake and Lake Sabrina have very steep sides and considerable annual fluctuations in surface elevations which severely limit the production of littoral aquatic vegetation. There have been no comprehensive limnological studies of these lakes. Limited water quality profiling of the lakes was conducted from June 1986 until November 1987 and are presented in Table 8.4-25 and Table 8.4-26. Field measurements of water temperature, pH, and dissolved oxygen was conducted at one point on each lake. In general, water temperature varied from lows of 32.3°F in March to 59.7°F in late August. In general, water temperature decreased with increasing depth.

Dissolved oxygen ranged from 11.98 mg/L in early March to 2.44 in late August and was generally above 100 percent saturation except in August when dissolved oxygen values dropped to less than 38 percent saturation. Dissolved oxygen inversely followed water temperature and decreased values were observed as water temperatures increased. Values for pH ranged from 6.81 to 9.32, however most values were between 7 and 8 pH units.

The chemical characteristics of the lakes are given in Table 8.4-27. The measurements were taken in the fall of 1985. The chemical composition of these lake waters appears typical for reservoirs of this elevation and latitude in the Sierra Nevada. There are three basic factors which cause the high elevation reservoirs of this portion of the High Sierra to be mineral and nutrient-poor. First, the watersheds are generally undisturbed and support very little human habitation. Second, the substrates in these drainages are dominantly igneous intrusive rocks, and third, the drainages contain very shallow and poorly vegetated soils. The combination of these factors results in very little leaching of minerals and nutrients into waters entering the reservoirs.

Table 8.4-25. 1986 Depth Profiles for Lake Sabrina

Date	Depth (meters)	Water Temperature (deg °C)	pH (units)	Dissolved Oxygen	
				mg/L	% Saturation
06/24/86	0.5	12.61	7.25	8.31	108.3
	2.5	11.16	7.26	8.72	110.1
	4.5	9.33	7.33	9.07	110.0
	6.5	8.64	7.34	9.31	111.3
	8.5	8.01	7.43	9.46	111.5
	10.3	7.50	7.46	9.59	111.8
08/19/86	0.5	15.41	7.27	7.93	109.9
	2.5	15.25	7.23	7.72	106.6
	4.5	15.23	7.25	7.63	105.3
	6.5	14.91	7.45	8.11	111.1
	8.5	14.50	7.71	8.23	111.8
	10.3	14.03	8.06	8.44	113.5
	12.5	12.81	7.89	8.45	110.6
	14.5	10.82	7.65	8.43	105.7
	16.5	10.05	7.30	6.97	85.9
10/27/86	0.5	7.29	6.81	9.33	108.3
	2.5	7.29	7.01	8.96	104.0
	4.5	7.31	7.09	8.91	103.4
	6.5	7.30	7.13	8.85	102.7
	8.5	7.26	7.15	8.82	102.3

Source: Lund undated

Table 8.4-26. 1987 Field Water Quality Depth Profiles for Lake Sabrina

Date	Depth (meters)	Water Temperature (deg °C)	pH (units)	Dissolved Oxygen	
				mg/L	% Saturation
03/18/87	0.5	0.14	7.14	11.98	114
	1.0	0.49	7.21	11.03	106
	2.0	1.66	7.26	10.45	105
	3.0	2.24	7.31	10.09	103
	4.0	2.80	7.35	9.70	100
	4.6	2.94	7.38	9.47	98
06/30/87	0.0	14.8	*	8.61	121
	0.5	14.5	*	8.70	122
	1.5	14.4	*	8.64	121
	2.5	14.4	*	8.62	120
	3.5	14.3	*	8.64	120
	4.5	14.3	*	8.64	120
	5.5	14.3	*	8.61	120
	6.5	14.2	*	8.74	122
	7.5	13.7	*	9.05	124
	8.5	13.1	*	9.26	126
	9.5	12.8	*	9.41	127
	10.5	12.1	*	9.64	128
	11.5	11.6	*	9.81	128
	12.5	10.5	*	10.41	133
08/24/87	0.5	15.39	7.74	2.58	37
	2.5	15.42	7.69	2.44	35
	4.5	15.42	7.66	2.44	35
	6.5	15.41	7.66	2.44	35
	8.5	15.37	7.62	2.48	35
	10.5	14.91	7.62	2.55	36
	12.5	13.47	7.63	2.60	36
	14.5	12.25	7.78	2.71	36
	15.l	11.92	7.75	2.72	36
11/03/87	0.5	8.48	7.04	8.42	102
	2.5	8.50	7.23	8.25	100
	4.5	8.52	9.32	7.87	95

Date	Depth (meters)	Water Temperature (deg °C)	pH (units)	Dissolved Oxygen	
				mg/L	% Saturation
	6.5	8.51	7.55	8.34	101
	8.5	8.53	7.66	8.07	98
	10.5	8.42	7.40	7.82	95
	11.0	8.52	7.66	8.14	99

Source: Lund undated

* Probe failure. No readings collected.

Note: low dissolved oxygen readings in the August 1987 measures are suspected to be erroneous as no corresponding fish kill was reported.

Table 8.4-27. Chemical Characteristics for South Lake and Lake Sabrina[(A)]

Parameter	South Lake		Lake Sabrina	
	Surface	Bottom	Surface	Bottom
Calcium (mg/L)	1.98	1.98	1.94	1.88
Magnesium (mg/L)	0.16	0.16	0.11	0.11
Sodium (mg/L)	0.34	0.34	0.18	0.28
Potassium (mg/L)	0.98	0.98	0.78	0.78
Nitrate as N (mg/L)	0.035	0.026	0.016	0.013
Sulfate as S (mg/L)	0.438	0.399	0.136	0.138
Bicarbonate	---	---	---	---

Source: Lund undated

[a] Samples collected September 1985.

As part of an ongoing program to monitor for changes in stream geomorphology at specific locations along Bishop Creek, water temperature data was collected at six locations along Bishop Creek, two locations along McGee Creek and one location on Birch Creek and are depicted in Figure 8.4-8. In general, water temperature was collected during the periods from October 2003 to October 2004 and April 2009 to October 2014 and again in 2019. The actual available data varied with each of the locations and is summarized in Table 8.4-28.

The water temperature data collection varied from every 15 minutes to hourly during the monitoring periods. The data was summarized and daily average, maximum and minimum values were obtained for each day of monitoring and are plotted in Appendix D (Volume 2). The results indicated that water temperature varied throughout the year with lows averaging near 32ºF during the winter months (December to March) and rising to slightly less than 95ºF in the summer months (June to August). The variations between maximum and minimum water temperatures for a given day was generally very small in the winter months and rose up to as much as 59ºF in the summer months.

WATER TEMPERATURE MONITORING

Where available, daily streamflow discharge data from nearby USGS stations were plotted with the water temperature data to assess if there was a correlation between streamflow and water temperature. Chart patterns suggest that the correlation is poor. Air temperature data (maximum and minimum daily values) were obtained from the Global Historical Climatology Network (GHCN) station located at Bishop Airport (COOP Station USW00023157) for the same period in which water temperature data was collected along Bishop Creek. The water temperature data was plotted along with air temperature data for Bishop Creek Site 1 for the period October 2003 to October 2004. The chart suggests that the correlation between air temperature and water temperature is very good with daily increases and decreases in air temperature strongly tracking water temperature changes in Bishop Creek.

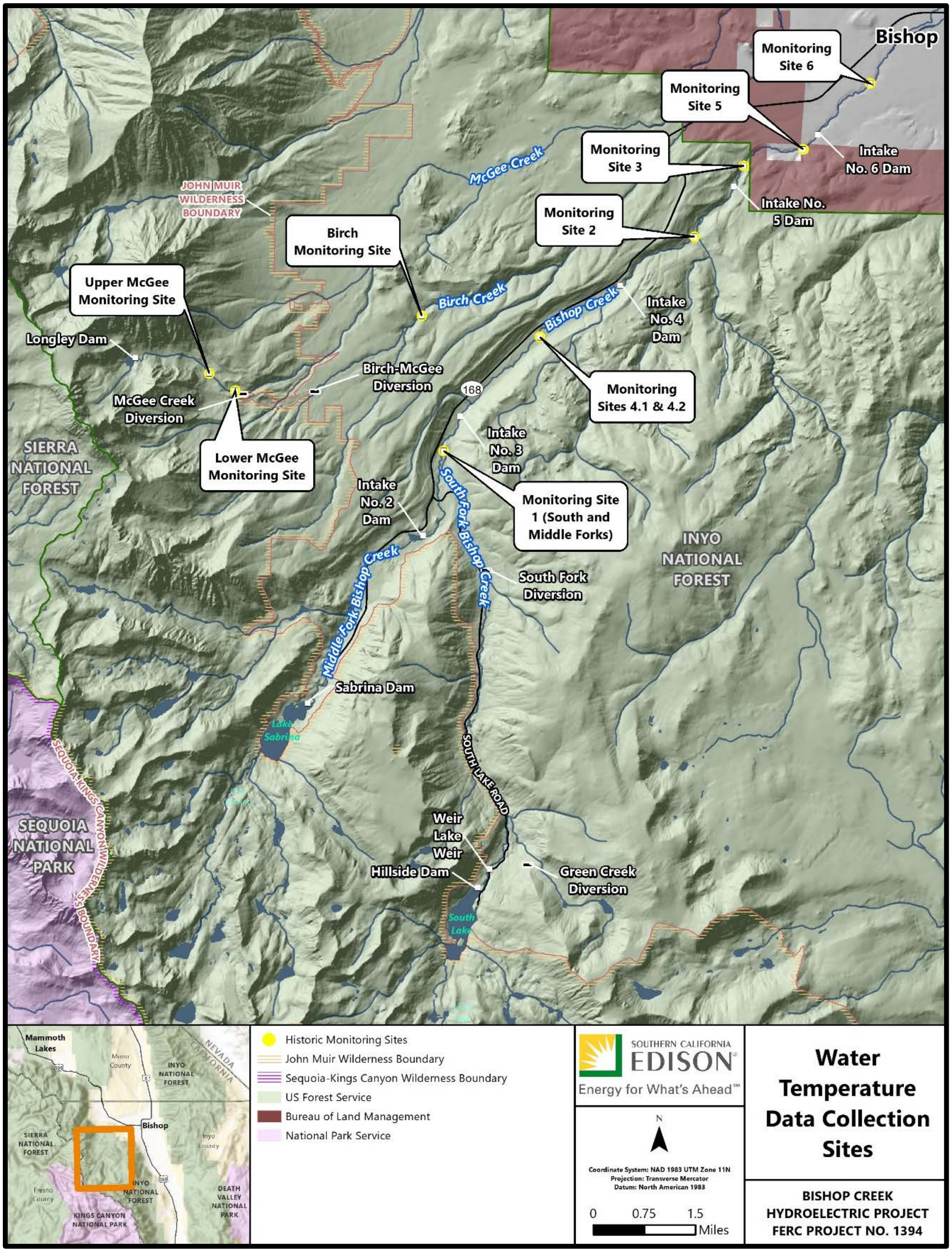

Figure 8.4-8. Water Temperature Data Collection Sites.

A second period was evaluated (September 2013 to October 2014) for Bishop Creek Site 4. Maximum and minimum daily air temperature data was obtained from Bishop Creek Airport (COOP Station USW00023157) and plotted with average, maximum, and minimum daily water temperature data calculated for Bishop Creek Site 4. Water temperature results observed at Bishop Creek Site 1 for the 2003-2004 period, appeared to track with the daily changes observed for air temperature at Bishop Airport. This suggests that regional air temperature changes are the major factors affecting water temperature in Bishop Creek.

Table 8.4-28. Water Temperature Monitoring Locations Along Bishop, Birch, and McGee Creeks

Site	Location	Closest USGS Station	Monitoring Periods
Bishop Creek - Site 1	Between Intake No. 2 and confluence of Middle and South Forks of Bishop Creek. Adjacent to Big Trees Campground.	10270877	10/12/2003-10/27/2004
Bishop Creek - Site 2	Between Plant 3/Intake No. 4 and confluence of Bishop and Coyote Creeks	10270940	1/1/2004-10/27/2004
			4/26/2009-9/17/2013
Bishop Creek - Site 3	Between Plant 4 and Site 5	10270970	10/12/2003-8/25/2004
			4/26/2009-10/29/2009
			9/18/2013-10/25/2014
Bishop Creek - Site 4	Between Plant 2/Intake No. 3 and Plant 3/Intake No. 4	10270885	10/12/2003-10/27/2004
			4/26/2009-10/29/2009
			9/18/2013-10/25/2014
Bishop Creek - Site 5	Between Site 3 and Plant 5	10270970	10/11/2003-10/28/2004
			4/26/2009-10/29/2009
			9/18/2013-10/25/2014
Bishop Creek - Site 6	Upstream of Plant 6	10271200	10/11/2003-5/7/2004
			4/26/2009-10/16/2011
Birch Creek	Approximately 1 mile downstream of point where instream flows are released	10268282	10/12/2003-10/27/2004
			4/27/2009-5/2/2013
			9/17/2013-10/27/2014
McGee Creek Above Diversion		NA	10/12/2003-10/24/2004
			6/10/2009-10/25/2014

Site	Location	Closest USGS Station	Monitoring Periods
McGee Creek Below Diversion		NA	10/12/2003-10/24/2004
			6/10/2009-5/2/2013
			10/12/2013-10/27/2014

Notes: NA=Not Applicable.

OTHER PROJECT RELATED MONITORING DATA

In 1980, the National Park Service (NPS) Water Resources Division conducted a surface water quality study of 13 selected sites in the upper reaches of North, Middle and South forks of Bishop Creek. A total of 13 samples were collected and analyzed for major ions and selected trace constituents and are presented in (Table-8.4-29). All constituents/parameters were below their respective MCL or basin standard except for chloride. Chloride ranged from 5 mg/L to 8 mg/L; the water quality objective for Bishop Creek at Intake No. 2 is 1.9 mg/L.

As part of the California's SWAMP for perennial streams, the CSWRCB conducted a water quality monitoring program on Bishop Creek from 2013 to 2016. The water quality was similar to that observed in previous studies with calcium and sodium the dominant cations. TDSs were rated as low, ranging from 25 mg/L to 66 mg/L; however, the solids averaged above the Basin Plan value of 27 mg/L for above Intake No. 2. Water temperature was generally less than 62.6°F. Two biological parameters detected were total coliform and E. Coli that ranged from 1 to 66 cfu per100 ml and 1 to 61 cfu per100 ml, respectively: exceeding the basin standard of 20 cfu/100 ml for fecal coliform.

Samples were collected over a 2-year period from 2015 to 2016 that indicated non-detectable values for fecal coliform and E. coli for Bishop Creek (total of three samples) at the USFS boundary (Table 8.4-30). Studies conducted by the RWQCB on Bishop Creek concluded that the impaired portion of Bishop Creek was located below Power Plant No. 6 and was likely the result of cattle grazing in or near Bishop Creek and potentially leaking sanitary sewer systems in lower Bishop Creek (Knapp and Craig 2016).

Table-8.4-29. Summary of NPS Water Quality Sampling on Bishop Creek

Parameter/Constituent (a)	Units	No. of Samples	Maximum	Minimum	Mean (b)	Basin Standards
Water Temperature	(deg °C)	13	10	3	7.9	NA
pH	(units)	13	8.4	6.9	7.7	6.5-8.5 (c)
Alkalinity (as $CaCO_3$)	(mg/L)	13	23	3	9.1	NA (d)
Specific Conductance	(µmhos/cm)	13	60	10	21.2	900-1,600 (e)
Calcium	(mg/L)	13	14.8	1.6	6.2	NA
Magnesium	(mg/L)	13	0.9	ND<0.1	0.3	NA
Sodium	(mg/L)	13	2.06	ND<0.1	0.82	NA
Potassium	(mg/L)	13	1.1	ND<0.1	0.5	NA
Chloride	(mg/L)	13	**8**	**5**	6.8	1.9 (f)
Silicon	(mg/L)	13	4.6	0.5	1.2	NA
Boron	(µg/L)	13	71	5	20.6	200 (g)
Bromide	(µg/L)	10	82.3	50.3	65.5	NA
Phosphorus	(µg/L)	13	7,477	ND<40	2,138	NA
Aluminum	(µg/L)	13	71	ND<10	37.3	200 (e)
Barium	(µg/L)	13	6	ND<2	3.7	1,000 (g)
Beryllium	(µg/L	13	1	ND<1	1.0	4
Cobalt	(µg/L)	13	5	ND<2	3.6	NA
Copper	(µg/L)	13	5	ND<2	3.1	1,000 (e)
Iron	(µg/L)	13	42	ND<10	22.3	300 (e)
Lithium	(µg/L)	13	95	ND<2	60.6	NA
Manganese	(µg/L)	13	5	ND<2	3.0	50 (e)
Molybdenum	(µg/L)	13	21	ND<4	9.9	NA
Nickel	(µg/L)	13	11	ND<4	8.0	100
Strontium	(µg/L)	13	21	3	9.6	NA
Titanium	(µg/L)	13	3	ND<2	2.3	NA
Uranium	(µg/L)	13	0.583	0.014	0.209	NA
Vanadium	(µg/L)	13	4	ND<0.1	'--- (h)	NA

Parameter/Constituent (a)	Units	No. of Samples	Maximum	Minimum	Mean (b)	Basin Standards
Zinc	(µg/L)	13	15	ND<4	7.2	5,000 (e)

Source: CEDEN 2018.

- Notes:
  a – Cerium, Chromium, Dysprosium, Scandium, Silver, Yttrium, & Zirconium were analyzed but not detected in all samples collected.
  b - Only detectable values were used in the calculation of the mean.
  c - U.S. Environmental Protection Agency (EPA) secondary standard for pH.
  d – NA = Not Applicable – no current MCL.
  e - CDWP secondary MCL.
  f - Basin Plan for Bishop Creek at Intake No. 2.
  g – California Drinking Water Program primary maximum contaminant level (MCL).
  h - Only one sample reported a detectable value.
  BOLD Equal to or above current Basin Plan, MCLs or notification levels.

Table 8.4-30. SWAMP Water Quality Sampling on Bishop Creek at USFS Boundary[1]

Parameter/Constituent (a)	Units	No. of Sample	Maximum	Minimum	Mean	Basin Standards
Oxygen, dissolved	(mg/L)	1	10.7	10.7	'---	varies
Water Temperature	(deg	12	16.4	2.2	9.84	NA
pH	(units)	12	**10.3**	7	7.97	6.5-8.5 (b)
Alkalinity (as $CaCO_3$)	(mg/L)	12	44	19	30.4	NA (c)
Turbidity	(NTU)	12	1.54	0.33	0.724	5 (d)
Specific Conductance	(µS/cm	12	104.4	40.7	74.63	900-1,600 (d)
Total Dissolved Solids (TDS)	(mg/L)	12	**66**	25	**46.0**	27 (a)
Calcium	(mg/L)	12	13.7	0.6	7.99	NA
Magnesium	(mg/L)	11	1.63	0.43	1.032	NA
Sodium	(mg/L)	11	4.82	1.1	3.085	NA
Potassium	(mg/L)	10	2.86	0.31	1.636	NA
Chloride	(mg/L)	12	1.6	0.36	0.884	1.9 (a)
Sulfate (as SO_4)	(mg/L)	12	9.55	3.15	6.157	250-500 (d)
Fluoride	(mg/L)	11	0.143	0.046	0.1014	0.15 (a)
Boron	(mg/L)	12	**0.481**	0.0058	0.1271	0.2 (a)
Nitrate and Nitrite (as N)	(mg/L)	11	0.0475	0.0065	0.01999	10 (e)
Nitrogen, Total	(mg/L)	12	**0.125**	0.049	0.0794	0.1 (a)
Phosphorus as P	(mg/L)	9	0.0094	0.0054	0.00752	NA
Orthophosphate as P	(mg/L)	12	0.0132	0.0051	0.00880	0.05 (a)
Fecal Coliform	cfu/10	27	**66**	**1**	**8.9**	20 (g)
E. Coli	cfu/10	24	61	1	8.0	NA

Source: CEDEN 2018

Notes:
1 – station 603BSP111
a – Basin Plan for Bishop Creek at Intake No. 2.
b – U.S. Environmental Protection Agency (EPA) secondary standard for pH.
c – NA = Not Applicable – no current MCL.
d - CDWP secondary MCL.
e - California Drinking Water Program primary maximum contaminant level (MCL).
f –.cfu - colony forming units
g – Lahontan Basin Plan
BOLD Equal to or above current MCLs or notification levels.

8.4.9.2 Summary of Water Quality Relicensing Study

Although the Bishop Creek Project is located in a relatively clean granitic watershed with limited factors to impact water quality, during TWG meetings undertaken as part of the relicensing effort, and in written comments, stakeholders expressed a need to develop an understanding of water quality parameters in the Bishop Creek Project area and establish baseline conditions for the future. Water storage and diversion activities could affect water quality in Bishop Creek Project waters or contribute to water quality issues downstream.

The following information was obtained from the first year (2020) of the proposed 2-year Water Quality Study (AQ 5), as well as preliminary summary results of the 2021 Water Quality Field Program, including a comparison to the 2020 results. Detailed information on the AQ 5 study can be found in Volume 3 of this DLA.

The goals and objectives of the Bishop Creek Program were:

- Monitor water quality[14] for 2 years on a regular basis at multiple monitoring sites.
  - Above-Project: establish reference baseline conditions of inflow from natural runoff in the watershed
  - In-Project: assess how or if water quality changes throughout various facilities within the Project area (i.e., various depths and locations in South Lake and Lake Sabrina, powerhouse discharges)
  - Below-Project: assess any/all potential impacts Bishop Creek Project operations may have on water quality that is leaving the Project area
- Monitor water temperature for 2 years on a regular basis at multiple monitoring sites
  - Above-Project: establish reference baseline conditions of inflow from natural runoff in watershed
  - In-Project: asses how or if water temperature changes throughout various facilities within the Project area (various depths and locations in South Lake and Lake Sabrina, power plant discharges)
  - Below-Project: assess any/all impacts Bishop Creek Project operations may have on water temperature that is leaving the Project area
- Ensure that future Bishop Creek Project facilities and operations are:

[14] The following water quality parameters were monitored as part of the 2020 study: dissolved oxygen, water temperature, turbidity, conductivity, total dissolved solids, orthophosphate, nitrate, total nitrogen, water quality (Secchi Disk) and E. coli

- o Consistent with the water quality goals and objectives for Bishop Creek in the Basin Plan (LRWQCB 1995)
- o Consistent with the desired conditions described in the 2019 Land Management Plan for the Inyo National Forest for Social and Economic Sustainability and Multiple Uses with the desired conditions described in "Land Management Plan for the Inyo National Forest" (USDA 2019) as they relate to ecological sustainability and diversity of plant and animal communities.

Additionally, the total depth for both lakes was greater than was previously reported. Equipment used to collect vertical profiles of dissolved oxygen and water temperature could not reach the maximum depth of the lakes during the June 2020 sampling period. Additional equipment was obtained to reach the bottom of the lakes in subsequent profiles conducted in 2020 and 2021.

METHODS

Vertical profiles of dissolved oxygen and temperature were collected at the deepest location(s) in South Lake and Lake Sabrina to identify the timing, extent, and duration of any lake stratification. The maximum depth for Lake Sabrina and South Lake was initially reported to be 78 feet and 130 feet, respectively. However, at South Lake, the maximum depth at the profile point on July 27, 2021, was 147.0 feet with a lake surface elevation of 9676.00-feet msl, and at Lake Sabrina, the maximum depth at the profile point on July 28, 2021, was 206.7 feet with a lake surface elevation of 9098.58-feet msl. Field measurements of dissolved oxygen and water temperature measurements were collected starting at approximately 0.5 meter (1.6 feet) below the water surface and at 1 meter (3.28 feet) below water surface and continuing in 1-meter increments until the total depth of the lake was obtained. The 1-meter increments were selected to align with the Water Quality Implementation Plan, which defined the thermocline as greater than 33.8º F per 1-meter of depth. This implementation plan was distributed to TWG participants for comments in 2020, and opportunity to discuss whether a change of methods is warranted was provided in November 2020. No comments were received which suggested a change in methods was necessary. Profiles were taken monthly June through October in both 2020 and 2021. When collecting dissolved oxygen and temperature profiles, the same sampling location was visited each time so that the relative change in the profile could be determined throughout the summer. Readings were taken every meter from the water surface to the lake bottom. Lake surface elevation was also recorded during each sampling date.

Bishop Creek dissolved oxygen and water temperature sampling was conducted during the same periods as the lake sampling, monthly in June 2020 and October 2020 and bi-monthly from early July to late September 2020. Measurements were sampled mid-depth in the middle of the creek, if accessible; otherwise, measurements were taken adjacent to the bank of the stream. Dissolved oxygen and water temperature data were recorded using a calibrated hand-held digital instrument. Samples were taken at North Fork Bishop Creek (background); Middle Fork Bishop Creek below Lake Sabrina; South Fork Bishop

Creek below South Lake; and below all power plants and in the tailwater of each power plant.

Secchi Disk readings were taken between June and October of 2020 within the deepest portion of Lake Sabrina and South Lake, at the same locations used for water temperature and dissolved oxygen profiles. One sample per site was taken using the Secchi Disk to approximate depth of the euphotic zone/light penetration.

Sampling for turbidity, conductivity, TDS, orthophosphate as phosphorus (PO_4-P), total nitrogen (T-Nit), and nitrate (NO_3-N) occurred at a minimum of once per month during June, July, August, and late September 2020, using a peristaltic pump or discrete depth sampler. At Lake Sabrina and South Lake, sampling took place within a deep hole in each lake and was performed at two points: one above and one below the thermocline. If no thermocline was identified, water samples were collected at one-half of the Secchi depth and 80 percent of the total depth of the lake at the time of sampling.

The riverine sampling for turbidity, conductivity, TDS, orthophosphate, T-Nit, and NO_3-N occurred at North Fork Bishop Creek; Middle Fork Bishop Creek below Lake Sabrina; South Fork Bishop Creek below South Lake; and below each power plant. Measurements were collected from straight reaches having uniform flow, and having a uniform and stable bottom contour, and where constituents were well mixed along the cross section. Sampling procedures followed the USGS sampling protocol.

Six separate sampling events between July 1 and August 15, 2020 for E. Coli occurred at South Lake and Lake Sabrina (adjacent to the boat ramp) and at any easily accessible location adjacent to shore at the Intake No. 2 forebay. Water samples were collected using a grab sampling method.

Additional information collected at each of the riverine sampling events included streamflow in cfs, air temperature, wind speed and direction, percent cloud cover, and, if known or attainable, the date, duration, and amount of the most recent precipitation event.

RESULTS

The information in the following sections was compiled using the Bishop Creek 2020 Water Quality Annual Report, distributed to TWGs in early 2021 (Donovan 2021), and results of the second year of monitoring.

A more detailed comparison with existing water data is included in the FTR for AQ 5, included in Volume 3 of this DLA, along with supporting field and laboratory reports.

SOUTH LAKE

In 2020, the dissolved oxygen and water temperature profiles for South Lake were similar for each monitoring period throughout the summer and early fall. Each exhibited elevated dissolved oxygen readings in the upper two thirds of the lake and very low dissolved oxygen readings in the bottom portion of the lake. A comparison was made to determine if the very low dissolved oxygen readings altered with lake elevation over the monitoring period, however, no major changes were noted. The very low dissolved oxygen readings, the rise in conductivity, and water temperature in the lower portion of the lake is suggestive of a stratified lake. When compared to the previous monitoring period, the ranges for dissolved oxygen in 2021 were similar to ranges observed in 2020 (Table 8.4-31). While the dissolved oxygen concentrations were below the basin objective at 10 percent saturation in the lower portion of South Lake, releases from South Lake into Bishop Creek are well above the anoxic zone.

Table 8.4-31. Summary of Dissolved Oxygen levels in South Lake From Vertical Transects [(a)]

Year	Lake Surface Elevation Range (ft msl)	Range of Dissolved Oxygen above and below Outlet [(b)]		
		Position[(c)]	Maximum	Minimum
2020	9747.82 – 9734.02	Above	9.61	7.07
		Below	8.55	0.00
2021	9693.20 – 9641.70	Above	9.53	7.30
		Below	8.94	0.00

Source: Donovan 2022

Notes:
a – Five transects were conducted in each calendar year.
b – From instantaneous measurements at 1-meter intervals from lake surface to bottom of survey/lake.
c – Position above or below lake outlet.

Field measurements indicated Secchi disk depth ranged from 8.5 to 12 meters below water surface between June and October. Thermoclines were not detected in June or July of 2020 but ranged from 17 to 18 meters in August 2020 and 28 to 35 meters in October 2020. Conductivity ranged from 20 microSiemens/cm (µS/cm) to 40 µS/cm in the shallow sampling zone, and 53 µS/cm to 1,880 µS/cm in the deeper sampling zone.

For samples collected above the outlet, TDS averaged 18 mg/L for the 2020 monitoring period and 21.5 mg/L for the 2021 monitoring period which are both above the basin objective for South Lake of 12 mg/L. Considering that South Lake is a headwaters lake in the Bishop Creek drainage, the elevated number appears to reflect background conditions and the original basin plan objectives for South Lake are indicative of limited data used to establish the water quality objectives for South Lake. While waters in the Project area are likely to continue to have values above the basin objectives, under the Proposed Action, the continued operations of the Bishop Creek Project is not anticipated to contribute to these vales.

NO3-N was not detected in any samples for both monitoring periods. Total-N was not detected in the 2020 monitoring period but averaged 0.1 mg/L for the 2021 monitoring period and equal to the South Lake basin plan objective of 0.1 mg/L. PO4-P was detected but all values were below basin plan objectives for samples collected above the outlet. While waters in the Project area may continue to have values above the basin objectives, under the Proposed Action, the continued operations of the Bishop Creek Project is not anticipated to contribute to these values.

Table 8.4-32. Summary of Laboratory Results for South Lake for Samples Collected above the Outlet Depth for 2020-2021 Monitoring Periods

Year	Parameter	Total Dissolved Solids (mg/L)	Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Ortho phosphate as P (mg/L)
2020	Maximum	33	ND*<0.110	ND<0.30	0.011
	Minimum	ND<10	ND<0.110	ND<0.30	ND<0.010
	Average**	18	ND<0.110	ND<0.30 (ND<0.10)**	ND<0.010
2021	Maximum	40	ND<0.110	0.17	ND<0.010
	Minimum	ND<10	ND<0.110	ND<0.10	ND<0.010
	Average**	21.5	ND<0.110	0.11	ND<0.010
Basin Objective (annual average/90th percentile)		12/20	0.1/0.1	0.1/0.4	0.03/0.04

Source: SCE 2022

Notes:

* Non-detection (ND) limits
* Arithmetic average is for all samples collected. For samples with ND values, 1/2 of the ND value was used to calculate average when more than one sample had detectable values, otherwise the ND value was used.
** ** Data collected during 2020 and 2021 have indicated that TKN makes up the entire amount of Total-N. The average for TKN is used as an average for the 2020 period.

Of the seven samples collected for E. coli in South Lake between July and August, of 2020, only one sample had a detectable value of E. coli with 1 most probable number in 100 millimeters (MPN/100ml. The single value was well below the basin plan of 100/300 MPN/100 ml. No detectable values of E. coli were found in the 2021 monitoring season (Table 8.4-32).

LAKE SABRINA

At Lake Sabrina, dissolved oxygen and water temperature profiles were similar for each monitoring period throughout the summer and early fall (Table 8.4-33). Each exhibited elevated dissolved oxygen readings in the upper two thirds of the lake and a gradual decline in dissolved oxygen near the bottom portion of the lake (well below the lake outlet). A comparison was completed to determine if the dissolved oxygen readings altered with lake elevation over the monitoring period; however, no changes were noted between the monthly monitoring periods. When compared to the previous monitoring period, the ranges for dissolved oxygen in 2021 were similar to ranges observed in 2020. While the dissolved oxygen concentrations were below the basin objective at 10 percent saturation in the lower portion of Lake Sabrina, releases from Lake Sabrina into Bishop Creek are well above the anoxic zone.

Table 8.4-33 Summary of Dissolved Oxygen Levels in lake Sabrina from Vertical Transects[(a)]

YEAR	LAKE SURFACE ELEVATION RANGE (ft msl)	RANGE OF DISSOLVED OXYGEN ABOVE AND BELOW OUTLET(b)		
		Position[(c)]	Maximum	Minimum
2020	9118.62 – 9108.97	Above	9.87	7.00
		Below	10.03	0.05
2021	9099.50 – 9095.09	Above	9.78	7.04
		Below	10.41	0.11

Source: Donovan 2022

Notes:
a – Five transects were conducted in each calendar year.
b – From instantaneous measurements at 1-meter intervals from lake surface to bottom of survey/lake.
c – Position above or below lake outlet.

Field measurements indicated Secchi disk depth of 7.5 – 12.0 meters between June 2020 and October 2020 sampling periods. Thermoclines were identified during all sampling periods and ranged from 9 – 14 meters in the July 2020 sampling period, and 10 – 14 meters in September 2020. Conductivity ranged from 20 – 30 µS/cm in the shallow zone above the thermocline and 20 – 40 µS/cm in the deeper zone.

For samples collected above the outlet, TDS averaged 21 mg/L for the 2020 monitoring period and 16 mg/L for the 2021 monitoring period which are both above the basin plan objective for Lake Sabrina of 10 mg/L. Considering that Lake Sabrina is a headwaters lake in the Bishop Creek drainage, the elevated number appears to reflect background conditions and the original basin objectives for Lake Sabrina are indicative of limited data used to establish the original water quality objectives. While waters in the Project area are likely to continue to have values above the basin objectives, under the Proposed Action, the continued operations of the Bishop Creek Project is not anticipated to contribute to these values.

NO3-N was not detected in any samples for both monitoring periods. Total-N was not detected in the 2020 monitoring period but was detected only once at 0.11 mg/L and below accurate detection limits; the recorded non-detect (ND) value averaged ND<0.1 mg/L for the 2021 monitoring period and below the Lake Sabrina (Lahontan Bains) Plan objective of 0.3 mg/L. PO4-P was detected once but all values were below basin objectives for samples collected above the outlet (Table 8.4-34). No Bishop Creek Project effects are anticipated with the Proposed Action.

Table 8.4-34. Summary of Laboratory Results for Lake Sabrina for Samples Collected above the Outlet Depth for 2020-2021 Monitoring Periods

Year	Parameter	Total Dissolved Solids (mg/L)	Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Ortho phosphate as P (mg/L)
2020	Maximum	31	ND<0.110	ND<0.30	0.022
	Minimum	11	ND<0.110	ND<0.30	ND<0.010
	Average*	21	ND<0.110	ND<0.30 (0.1)**	ND<0.010
2021	Maximum	19	ND<0.110	0.17	ND<0.010
	Minimum	12	ND<0.110	ND<0.10	ND<0.010
	Average*	16	ND<0.110	ND<0.10	ND<0.010
Basin Objective (annual average/90th percentile)		10/17	0.2/0.3	0.3/0.6	0.03/0.05

Source: Donovan 2022.

Notes:

* Arithmetic average is for all samples collected. For samples with ND values, 1/2 of the ND value was used to calculate average when more than one sample had detectable values, otherwise the ND value was used.

** Data collected during 2020 and 2021 have indicated that TKN makes up the entire amount of Total-N. The average for TKN is used as an average for the 2020 period.

Seven samples for E. coli were taken between July 1, 2020, and August 15, 2020. Of these, one, collected on August 5, 2020, had a detectable value at 3.1 MPN/100ml. All other samples were ND less than 1.0 MPN/100 ml. The August 5 value was well below the basin plan of 100 MPN/100 ml. Of the seven samples taken in 2021, five detectable values were observed, ranging from 3.1 to 310 MPN/100 ml. Two samples exceeded the 50 MPN/100 ml for conducting qPCR analysis; one sample collected on July 26, 2021, had 310 MPN/100 ml and one sample collected on July 29, 2021, had 180 MPN/100 ml. The qPCR analysis revealed that both samples had no detectable human DNA present. The geometric mean for all E.coli samples was calculated at 16.3 MPN/100 ml and was well below the Inland Surface Water Plan objective of 100 MPN/100 ml. The highest value of 310 MPN/100 ml is below the Inland Surface Water Plan 90th percentile level of 320 MPN/100 ml (Table 8.4-34).

INTAKE NO. 2 RESERVOIR

A total of seven samples were collected for E. coli at the Intake No. 2 Reservoir in 2020, and ranged from ND less than 1.0 MPN/100 ml to 24 MPN/100 ml. The geographic mean for these samples was calculated at 4.73 MPN/100 ml, which is well below the basin plan of 100 MPN/100 ml. The 2021 sampling period ranged from 2.0 to 210 MPN/100 ml. The geographic mean for these samples was calculated at 8.86 MPN/100 ml, which is well below the basin plan of 100 MPN/100 ml. The highest value of 210 MPN/100 ml is below the Inland Surface Water Plan 90th percentile objective level of 320 MPN/100 ml (Table 8.4-35. One sample exceeded the 50 MPN/100 ml for conducting qPCR analysis; the sample collected on July 29, 2021, had 210 MPN/100 ml. The qPCR analysis revealed that the sample had no detectable human DNA present.

Table 8.4-35. Summary of E. Coli Laboratory Results for Monitored Reservoirs in Bishop Creek Watershed

Parameter	Range of E. Coli (MPN/100 ml)		
	South Lake	Lake Sabrina	Intake No. 2 Reservoir
2020 Maximum	1.0	3.1	24
2020 Minimum	ND<1.0	ND<1.0	ND<1.0
2020 Geometric Mean	1.0	1.21	4.73
2021 Maximum	ND<1.0	310	210
2021 Minimum	ND<1.0	ND<1.0	2.0
2021 Geometric Mean	ND<1.0	16.3	8.86
Inland Surface Water Objectives for E.coli			
Geometric Mean	100		
90th Percentile	320		

Source: Donovan 2022.

BISHOP CREEK

Water temperature at Bishop Creek ranged from 6.9 ºC to 17.8 ºC, with the lower values occurring near the upper reaches of Bishop Creek and the higher values generally occurring in the lower reaches. In 2020, dissolved oxygen occurred in a narrow range from 7.12 mg/L to 9.68 mg/L. During the 2021 monitoring period, dissolved oxygen values were similar ranging from 7.08 mg/L to 9.74 mg/L with an average of 8.33 mg/L (Table 8.4-36. The oxygen saturation level for the observed water temperature and air pressure was generally above 98 percent, and often exceeded 100 percent for all monitored reaches of Bishop Creek.

Table 8.4-36. Summary of Dissolved Oxygen and Water Temperature for Bishop Creek 2020-2021 Monitoring Periods

Year	Parameter	Water Temperature (degrees in C)	Dissolved Oxygen (mg/L)	Barometric Pressure (in Hg)	Calculated DO Saturation (%)
2020	Maximum	17.8	9.68	25.53	124.9%
	Minimum	6.9	7.12	21.15	98.0%
	Average*	12.7	8.62	23.36	104.3%
2021	Maximum	18.4	9.74	25.60	116.6%
	Minimum	8.4	7.08	21.10	98.9%
	Average*	14.1	8.33	23.36	104.0%

Source: Donovan 2022

Notes:
* Arithmetic average is for all samples collected.

Field and laboratory water quality samples were collected along Bishop Creek in June, July, August, and September of 2020. Turbidity ranged from 0.36 to 69.6 nephelometric turbidity units (NTU) with the highest concentration at Bishop Creek below Power Plant No. 3 during the June 2020 sampling period. Generally, Bishop Creek had turbidity values below 5 NTU for all locations and all sampling periods. Basin water quality objectives require an increase in turbidity no greater than 10 percent of natural conditions. Generally, turbidity values were similar for all reaches of Bishop Creek.

Conductivity ranged from 20 to 78 µS/cm at 25ºC with the highest concentration observed at South Fork of Bishop Creek below South Lake during the September 2020 sampling period. Generally, conductivity increased in value progressively downstream in the Bishop Creek watershed.

For all Bishop Creek monitoring locations, TDS ranged from 10 mg/L to 41 mg/L in 2020, with the highest concentration occurring below Power Plant No. 4 and below Power Plant No. 6 in September 2020. The average TDS value in 2020 was 26 mg/L. During the 2021 monitoring period, TDS was similar, ranging from 14 mg/L to 46 mg/L, with an average of 32 mg/L Table 8.4-37). A comparison was made of general water quality for Bishop Creek below Lake Sabrina to water quality objectives for Bishop Creek near Intake No. 2 in the Basin Plan. For the 2020 monitoring period, TDS ranged from 10 mg/L to 30 mg/L with an average of 19 mg/L which is below the basin plan objective of 27 mg/L. During the 2021 monitoring period, TDS was similar ranging from 14 mg/L to 28 mg/L with an average of 23 mg/L which is below the basin plan objective. No Bishop Creek Project effects are anticipated with the Proposed Action.

NO_3-N was ND less than 0.110 mg/L in all samples during both monitoring seasons. Total-N was detected and ranged from ND less than 0.30 mg/L to 0.41 mg/L with an average of between 0.1 mg/L and 0.2 mg/L in the 2020 monitoring period which is at or slightly above the 0.1 basin plan objective. Total-N had similar values in the 2021 monitoring period and ranged from ND less than 0.11 mg/L to 0.16 mg/L with an average of 0.1 mg/L which is equal to the basin plan objective. While waters in the Project area may continue to have values above the basin objectives, under the Proposed Action, the continued operations of the Bishop Creek Project is not anticipated to contribute to these values.

PO4-P was detected in 2020 but was ND less than 0.010 mg/L in 2021. All values for both periods were below basin plan objectives.

Table 8.4-37. Summary of Laboratory Results for Bishop Creek 2020-2021 Monitoring Periods

Year	Parameter	Total Dissolved Solids (mg/L)	Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Ortho phosphate as P (mg/L)
2020	Maximum	41	ND<0.110	1.1	0.044
	Minimum	ND<10	ND<0.110	ND<0.30	ND<0.010
	Average*	26	ND<0.110	0.19	ND<0.010
2021	Maximum	46	ND<0.110	0.37	0.018
	Minimum	14	ND<0.110	ND<0.10	ND<0.010
	Average*	32	ND<0.110	0.12	ND<0.010
Bishop Creek Below Lake Sabrina**					
2020	Maximum	30	ND<0.11	0.41	0.017
	Minimum	10	ND<0.11	ND<0.30	ND<0.010
	Average*	19	ND<0.11	0.2	0.01
	Average***	19	ND<0.11	0.1	0.01
2021	Maximum	28	ND<0.11	0.16	ND<0.010

Year	Parameter	Total Dissolved Solids (mg/L)	Nitrate as N (mg/L)	Total Nitrogen (mg/L)	Ortho phosphate as P (mg/L)
	Minimum	14	ND<0.11	0.11	ND<0.010
	Average*	23	ND<0.11	0.1	ND<0.010
	Average***	23	ND<0.11	0.1	ND<0.010
Basin Objective (annual average/90th percentile)		27/29	0.1/0.2	0.1/0.4	0.05/0.09

Notes:

* Arithmetic average is for all samples collected. For samples with ND values, 1/2 of the ND value was used to calculate average when more than one sample had detectable values, otherwise the ND value was used.

** Closest Bishop Creek monitoring location to Basin Plan objective location (Bishop Creek near Intake No. 2).

*** Arithmetic average is for all samples collected. For samples with ND values, Zero was used for ND values to calculate average when more than one sample had detectable values, otherwise the ND value was used.
Source: Donovan, 2022

POWERHOUSE TAILWATER

During 2020, water temperature ranged from 10.5 ºC to 15.4 ºC in the power plant tailraces, with the lower values generally occurring in the upper reaches of Bishop Creek, and the higher values occurring in the lower reaches of Bishop Creek. During the 2021 monitoring period, water temperature of the power plant tailwater was similar, ranging from 9.1°C to 16.8°C, with an average of 13.8°C. Dissolved oxygen occurred in a very narrow range from 8.17 mg/L to 9.64 mg/L in 2020, and 7.77 mg/L to 9.72 mg/L in 2021 (Table 8.4-38). The oxygen saturation level for the observed water temperature and air pressure at each of the tailraces was generally above 96 percent and often exceed 100 percent for the monitored tailraces of each of the power plants.

Table 8.4-38. Summary of DO and Water Temperature for Power Plant Tailraces 2020-2021 Monitoring Periods

Year	Parameter	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Barometric Pressure (in Hg)	Calculated DO Saturation (%)
2020	Maximum	15.4	9.64	25.54	114.1%
	Minimum	10.5	8.17	23.11	95.6%
	Average*	12.9	8.82	24.53	102.9%
2021	Maximum	16.8	9.72	25.60	112.9%
	Minimum	9.1	7.77	23.05	96.5%

Year	Parameter	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Barometric Pressure (in Hg)	Calculated DO Saturation (%)
	Average*	13.8	8.61	24.49	101.6%

Source: Donovan, 2022

Notes:
* Arithmetic average is for all samples collected.

8.4.10 Potential Adverse Effects and Issues

The water quality monitoring completed and reported in the Bishop Creek Water Quality Study (Donovan 2022) indicate that water quality parameters in the Project area are generally consistent with the Lahontan Basin Plan (LRWCB 1995) with some observed exceedances observed for TDS and Total-N, neither of which are attributed to Project operations. The data collected by SCE suggests that the basin plan objectives are not indicative of background conditions for TDS as these related to South Lake and Lake Sabrina in particular are high, granitic, alpine lakes at the head of the system. SCE notes that related to South Lake and Lake Sabrina in particular.

The following sections address potential effects as identified by the TSP and SD1 (Table 8.1-1). Based on the completed studies, and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action

8.4.10.1 Potential Impacts on Water Quality in Project Reservoirs and Affected Stream Reaches

The water quality in the Bishop Creek Project reservoirs and potential affected stream reaches is characteristic of upper headwater lakes and streams in the eastern Sierra Nevada Based on the 2 years of water quality monitoring in the potentially affected reservoirs and streams, no Bishop Creek Project effects are anticipated with the Proposed Action on the existing water quality in Project reservoirs and stream reaches.

8.4.10.2 Consistency with Inyo National Forest Land Management Plan

One goal of the AQ 5 study was to review whether the Bishop Creek Project is consistent with the desired conditions described in the 2019 Land Management Plan for the Inyo National Forest for Social and Economic Sustainability and Multiple Uses with the desired conditions described in “Land Management Plan for the Inyo National Forest” (USDA 2019) as they relate to ecological sustainability and diversity of plant and animal communities. Based on the results of the Water Quality study discussed above, the Bishop Creek Project appears to be consistent with the following desired condition relating to water quality:

WTR-FW-DC 02: water quality supports state-designated beneficial uses of water. Water quality is sustained at a level that retains the biological, physical, and chemical integrity of aquatic systems and benefits the survival, growth, reproduction, and migration of native aquatic and riparian species.

8.4.11 Proposed Mitigation and Enhancement Measures

SCE proposes to maintain current operations at the Bishop Creek Project and maintain current minimum instream flow requirements (PME-1, Appendix A, Volume 2). PME-2 (Appendix A, Volume 2) describes continuation of the existing methods (i.e., Gaging Plan) for measuring stream flows and compliance with any minimum instream flow requirements.

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8.5 FISH AND AQUATIC RESOURCES

This section describes fish and aquatic resources that have the potential to occur in the Bishop Creek Project area. The discussion is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of the Bishop Creek Project effects. For the purposes of the Fish and Aquatic studies, the Bishop Creek Project area is defined as the FERC Project boundary. The Study area includes the Bishop Creek watershed beginning at the Project reservoirs, downstream to Power Plant No. 6.

For fish and aquatic studies conducted as part of this relicensing effort, the Bishop Creek Basin (including the South and Middle forks) was divided into 10 reaches to reflect the independent hydrologic influences and varying fishery management objectives of each reach (Figure 8.5-1). The studies included Birch and McGee creeks below their respective diversion points. SCE addressed the potential impacts to macroinvertebrates by characterizing the dominant substrates and how the presence/absence of suitable substrates affect macroinvertebrate distribution using Physical Habitat Simulation (PHABSIM) model. Each PHABSIM transect described reach-specific dominant substrates and was analyzed in the context of macroinvertebrate habitat in the Final Technical Report (FTR) as described in Volume 3, Final Technical Reports. For reaches 4,6, Birch and McGee creeks, where PHABSIM modeling was not feasible, SCE gathered empirical measurements across a robust flow range from half the existing flow through double the existing flow, consisting of three flow increments (per USFS and CDFW direction during TWG meetings). While additional increments may better express an inflection point. this was not a specific goal of this study. Whether habitat in a reach is defined as adequate is done on a case-by-case basis, taking into account streamflow, water quality, food sources, physical habitat, and biotic interactions.

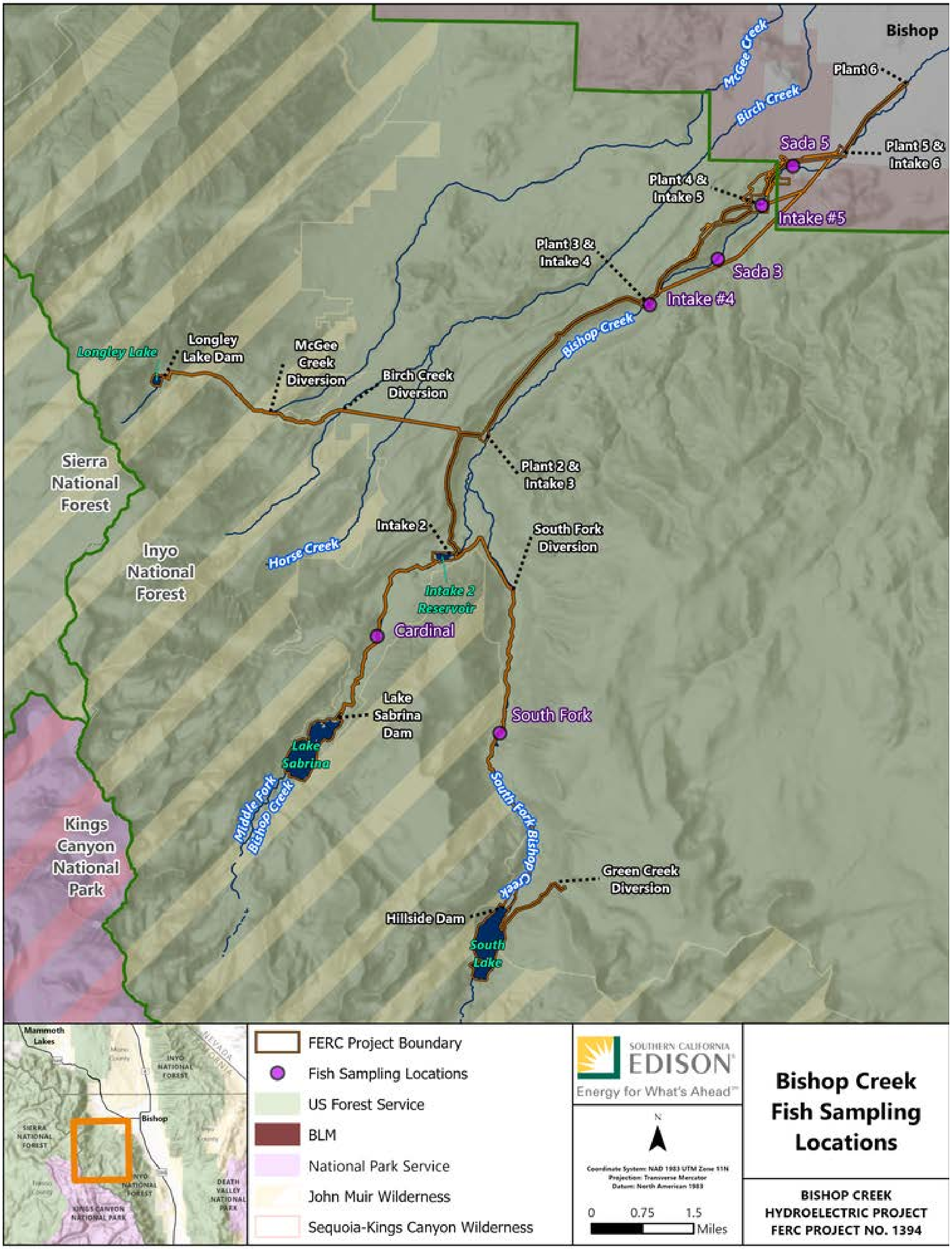

Figure 8.5-1. SCE Fish Sampling Locations.

8.5.1 AQUATIC HABITAT

Bishop Creek is the largest tributary to the Owens River and includes a drainage area of approximately 70 square miles. Aquatic habitat in the Bishop Creek Project area is comprised of small, high-elevation oligotrophic lakes and reservoirs, and high-gradient stream segments dominated by cascades, riffles, chutes, runs, and occasional small pocket pools (Photo 8.5-1). Plant intake forebays create small, impounded ponds that provide aquatic habitat for fish species (Photo 8.5-2). Gradient exceeds 2 percent in parts of the drainage (Dienstadt et al., 1985). Water clarity is generally high due to the limited nutrients and suspended solids in the system. Shoreline habitats along the creeks are generally bordered by native riparian vegetation including horsetail and wild rose, as well as scattered outgrowth of tree species including Jeffrey pine (*Pinus jeffreyi*), willow species, aspen, and cottonwood (Photo 8.5-1). The stream bed is generally dominated by cobble and boulder substrates, with patches of gravel and sand. Instream cover is provided by boulders, undercut banks, overhead vegetation, root wads and woody debris.

Photo 8.5-1. Typical Substrate and Riparian Cover in the Middle and Lower Bishop Creek Project Area.

Photo 8.5-2. Plant Intake Forebay Pools.

Note: Photos looking upstream from spillways

An Instream Flow Incremental Methodology (IFIM) study was completed during the late 1980s, and the results were used to inform minimum flows in the system (EA Science

1986). Flows were developed and implemented based on habitat requirements for salmonid species. Prior to the implementation of minimum flows, stream flow in bypass reaches below plant 4 was inconsistent, with extensive periods with no flow other than groundwater accretion (SCE 1986). Current minimum flows are described in Table 8.5-1Table and shown in Figure 8.5-2.

Table 8.5-1. Bishop Creek Minimum Flows Under the Current License

Reach (Upstream to Downstream)	IFIM Reach Number	Minimum Flow (CFS)	Duration
South Lake to S. Fork Diversion	Reach 10	13 cfs or natural flow, whichever is less	Year round
South Fork below the South Fork Diversion	Reach 9	10 cfs	Last Friday in April through October 31
		7 cfs	November 1 through last Thursday in April
Lake Sabrina to Intake 2	Reach 8	13 cfs or natural flow, whichever is less	Year round
Below Intake 2	Reach 7	10 cfs	Last Friday in April through October 31
		7 cfs	November 1 through last Thursday in April
		5 cfs	year-round in dry years*
Below South Fork Confluence**	Reach 6	20 cfs	Last Friday in April through October
		14 cfs	November 1 through last Thursday in April
Below Intake 3 (Plant 2 to Plant 3)	Reach 5	13 cfs	Year round
Below Intake 4 (Plant 3 to Plant 4)	Reach 3***; Reach 4	5 cfs	Year round
Below Intake 5 (Plant 4 to Plant 5)	Reach 2	12 cfs	Year round
Below Intake 6 (Plant 5 to Plant 6)	Reach 1	No flow requirement	n/a
McGee Creek Diversion		1 cfs or , whichever is less	Year round
Birch Creek Diversion		0.25 or , whichever is less	Year round

*defined as “less than 75% of April 1st (normal) snow water equivalent”
**this reach has no IMF defined in the existing license; flows in this reach are the sum of releases from Intake 2 and releases from the South Fork diversion
***receives 5 cfs + Coyote Creek inflow

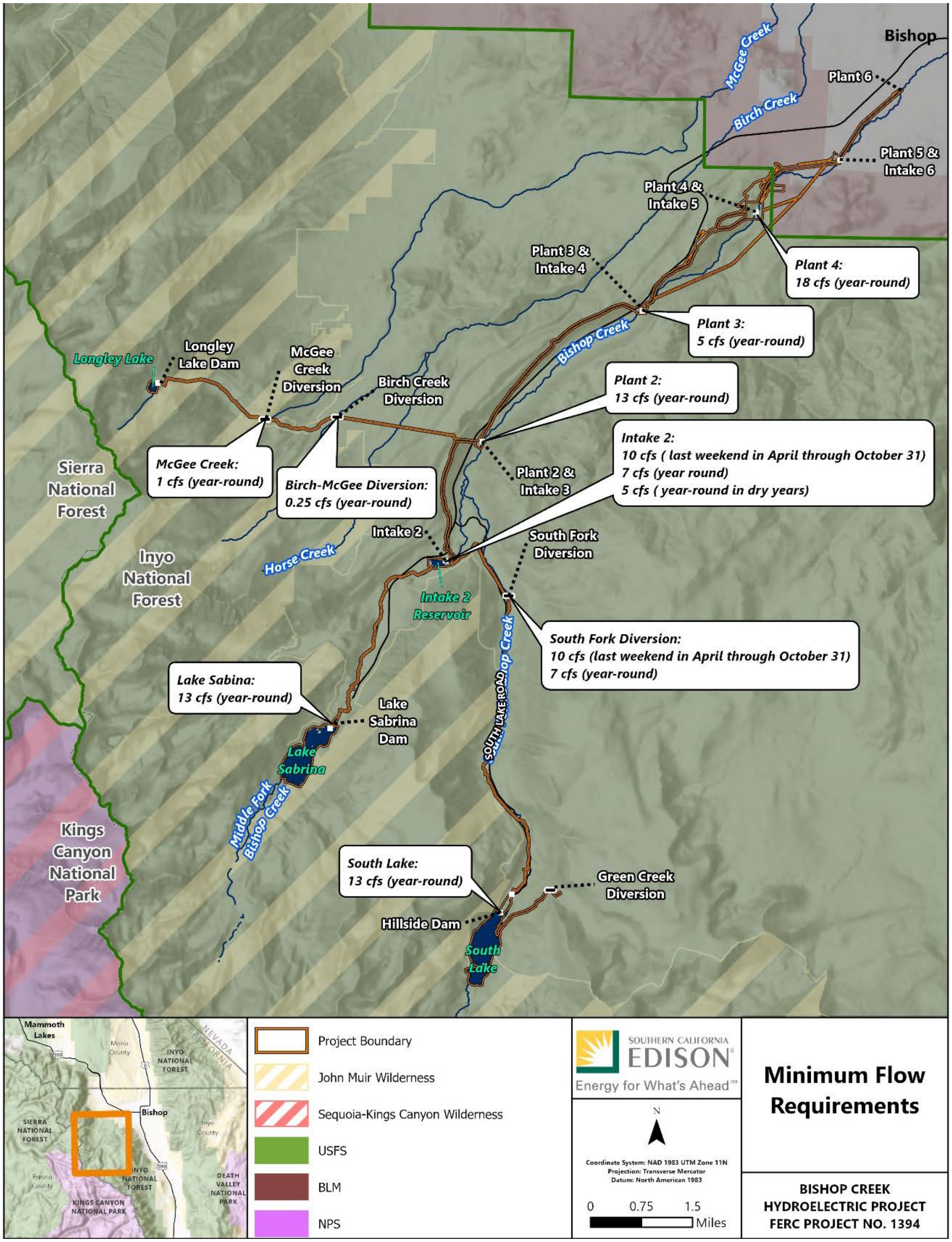

Figure 8.5-2. Minimum Flow Requirements.

8.5.2 Fish Assemblage

Brook trout *Salvelinus fontinalis*, rainbow trout *Oncorhynchus mykiss*, and brown trout (*Salmo trutta*) have been introduced into Bishop Creek Project waters by CDFW. Historically, rainbow trout have been stocked for put and take fishery. Currently, Lake Sabrina and South Lake are stocked with 500 to 1,000 fish per week during the fishing season (N. Buckmaster, CDFW, personal communication). Segments of Bishop Creek include self-sustaining brown trout fisheries, and McGee and Birch creeks maintain passively managed, scattered brook trout populations, as well as Owens speckled dace. The CDFW manages the reaches of Bishop Creek downstream from Plant No 4 primarily for native fish species, including Owens sucker, and manages Bishop Creek upstream of Plant No. 4 as a self-sustaining brown trout fishery (N. Buckmaster, CDFW, personal communication, October 2018 TWG meeting).

Headwater lakes and reservoirs are located at higher elevations (i.e., greater than 9,000-feet msl), and contain multiple fish species. Spawning of Owens sucker, an illegally introduced species to Lake Sabrina, has been previously documented in littoral habitats near the Lake Sabrina dam (N. Buckmaster, CDFW, personal communication). Brook trout, brown trout, and rainbow trout were documented in both Lake Sabrina and South Lake during this timeframe during gillnetting surveys that were conducted in several SCE east-Sierra reservoirs during the mid-1980s (EA Science 1987). It was noted that upstream migration of spawning trout was possible from South Lake and Lake Sabrina into tributary streams, as there were no natural barriers such as ledges or falls.

Fish collections in Longley reservoir have documented brook trout as the most abundant species (SWS 2022). SCE employed gillnets in 2020 to collect presence-absence data in Longley reservoir at the recommendation of CDFW and the USFS, as part of relicensing studies, although neither the gear nor the study methodology was designed to collect young-of-rear (YOY) trout. Other higher elevation lakes in the Bishop Creek watershed upstream of the Bishop Creek Project area are reported to contain self-sustaining populations of non-indigenous golden trout (*Oncorhynchus mykiss aguabonita*), as well as brown and brook trout (CDFW 2018). Introduction of these species into what were previously fishless ecosystems has resulted in negative impacts to other aquatic organisms, including Sierra Nevada yellow-legged frogs (SNYLF). As a result of these introductions and impacts, CDFW developed the Aquatic Biodiversity Management Plan for Lakes in the Bishop Creek Basin of the Sierra Nevada (CDFW 2004). The goal of this plan is the protection of at-risk amphibian populations. Table 8.5-2 summarizes CDFW's records of the current distribution of trout at representative reference points throughout the Bishop Creek drainage while Table 8.5-3 identifies those fish known to occur in the Bishop Creek Project vicinity.

Dienstadt et al. (1985) conducted fish assemblage surveys across the Owens River watershed. Sampling sites included reaches of Bishop, McGee, and Birch creeks. Table 8.5-4 summarizes habitat and fish abundance data recorded during sampling efforts. Brown trout were abundant across sampling locations, with over 3,000 brown trout per mile in reaches of Bishop Creek. Rainbow trout were documented in reaches of the South Fork, 4-6 miles upstream of the mainstem Bishop Creek.

Table 8.5-2. Distribution of Catchable Trout Throughout the Bishop Creek Basin

LOCATION*	ACRES	ELEVATION (ft)	SPECIES	COMMENTS
Schober Holes	3.91	11,847	brook trout, golden trout	back country
Tyee Lake	11.9	11,011	brook trout, rainbowtrout	back country
Piute Lake	2106	10,952	brook trout, rainbowtrout	back country
Wonder Lakes	5.24	10,893	brook trout	back country
Treasure Lake	12.1	10,667	golden trout	back country
Dingleberry Lake	5.9	10,486	brook trout, browntrout	back country
South Lake	180	9,750	hatchery trout	last stocked 2021
North Lake	20	9,255	hatchery trout	last stocked 2021
Lake Sabrina	186	9,000	hatchery trout	last stocked 2021
SCE Intake 2	15	9,000	hatchery trout	last stocked 2021
Middle Fork Bishop Creek	n/a	variable	hatchery trout	last stocked 2021
South Fork Bishop Creek	n/a	variable	hatchery trout	last stocked 2021

Source: CDFW 2018
*Listed in Descending Order of Elevation

Table 8.5-3. Fishes Known to Occur in the Vicinity of the Project

FAMILY	SCIENTIFIC NAME	COMMON NAME	NOTES
Catostomidae	*Catostomos fumeiventris*	Owens sucker	Believed by CDFW to occupy Lake Sabrina
Cyprinidae	*Siphateles bicolor*	Owens Tui chub	Recorded by CDFW in Bishop Creek and canal below Project area
Gasterosteida	*Gasterosteus aculeatus*	3-spine stickleback	Recorded by CDFW in Bishop Creek and canal below Project area
Leuciscidae	*Rhinichtyys osculus*	Speckled dace	Known to inhabit Bishop Creek below Project area
Salmonidae	*Salvinus fontinalis*	Brook trout	Non-indigenous to Bishop Creek drainage
Salmonidae	*Oncorhynchus mykiss*	Rainbow trout	Non-indigenous to Bishop Creek drainage
Salmonidae	*Salmo trutta*	Brown trout	Non-indigenous to Bishop Creek drainage
Salmonidae	*Oncorhynchus mykiss aguabonita*	Golden Trout	Non-indigenous to Bishop Creek drainage

Source: CDFW 2018; Sada and Knapp, 1994a, 1994b; Sada, 1997, 2005

Table 8.5-4. Summary of Habitat and Trout Density from Bishop, McGee, and Birch Creeks During 1983-1984

STREAM SEGMENT	HABITAT	TROUT PER MILE			NOTES
		Brown	Rainbow	Brook	
Bishop Creek 2	riffle and run cobble and sand	1716			~300 yards below Coyote Creek
Bishop Creek 5	cascading glacial deposits, fair cover, pocket water	3442			~ 3 miles above Coyote Creek
Bishop Creek 4	cascading glacial deposits, boulder cover, pocket water	3980			3.5 miles above Coyote Creek
Bishop Creek 3	stair-stepping pools and riffle, boulder, and cobble substrate fair cover -boulders	1866			~ 1/4 mile downstream from BirchCreek inflow
Bishop Creek 1	stair-stepping pools cascades, boulder cobble and gravel substrate	1369			immediately upstream from South Fork
S. Fork Bishop Ck 4	riffle, run, pool; fair cover, limiting to larger fish	2939			1.5 miles upstream from Bishop Creek
S. Fork Bishop Ck 3	riffle and run, few pools; boulder dominant, good cover undercut banks	1456	155		~ 4 miles above Bishop Creek
S. Fork Bishop Ck 2	pocket water, runs and riffles, boulder, cobble, sand, andgravel, undercut banks	3941	325		~ 5 miles above Bishop Creek
S. Fork Bishop Ck 1	high gradient stair-stepping riffle and small pools, boulder/cobble, fair cover	1630	619		~6 miles above Bishop Creek
N. Fork Bishop Ck. 1	wet meadow, excellent cover overhanging vegetation, undercut banks and pools	1626	84	2112	annually stocked with 20,000 rainbow trout
Birch Creek 1	hillside meadow with fast flow			138	not stocked
McGee Creek 2	shallow run and riffle with boulder and cobble, dense riparian vegetation	1109			in Longley Meadow
McGee Creek 1	plunge pools and short cascades, logs, and small pools -fair cover	940		1162	~ 12 miles above Highway 395

Source: Dienstadt et al., 1985

SCE conducted a fish entrainment study at Power Plant No. 3 and Power Plant No. 5 during the late 1980s. Draft tube sampling was conducted for 883 hours at Power Plant No. 5, and 1259 hours at Power Plant No. 3. It was estimated that 4 brown trout and 10 rainbow trout were entrained monthly at Power Plants No. 5, and 6 brown trout and 1 rainbow trout were entrained monthly at Power Plant No. 3. It was noted that some of the fish collected during netting may have entered the nets from the tailrace side, rather than entering via entrainment. The current stocking agreement between SCE and CDFW is intended to replace fish lost and currently provides for 2,500 fish every 5 years.

Biosystems Analysis, Inc. documented the ecology, movement, and reproduction of adult brown trout, spawning habitat, entrainment and angler use in Bishop Creek, in support of TROUT, a population model applied to Bishop Creek (Biosystems 1991b). The TROUT model was designed to examine the effects of different water resource and fishery management alternatives in Bishop Creek. Redd surveys revealed that females often selected sub-optimal substrates to spawn, and that such substrates yielded longer incubation periods prior to fry emergence relative to optimal substrates. Spawning occurs throughout November, with the peak in the latter half of the month. Most redds were located within 0.37 miles upstream from intake diversion forebay pools and these pools provided significant roles in maintaining the adult-sized brown trout population, where 2+ and 3+ aged brook trout were dominant (Biosystems, 1991a).

The TROUT model (Biosystems, 1991b, 1991c) results indicated that downstream movement appeared to be dominated by escapement from forebay impoundment pools in response to density-dependent carrying-capacity factors. Neither the exit of these fish from forebay populations nor angling pressure materially affected localized forebay populations. The forebays provide a reserve of adults that maintains the population and allows reproduction to maintain population resilience.

SCE conducted regular monitoring studies of brown trout abundance and growth in the Bishop Creek Project area from 1991-2010, following the introduction of continuous minimum flows in most plant bypass reaches (EA Science, 1986; Sada and Knapp, 1993; Sada 1997, 2006; Sada and Rosamond 2010). Studies were conducted at established reference stations in Bishop Creek below the intakes for Power Plants No. 3 and 5, and in McGee Creek. The same methodologies were used across years, and reference stations were selected in areas that were relatively isolated from angling to minimize the effects of angler exploitation on population metrics. Fish were collected at each site using a multiple-pass depletion sampling design with backpack shocking gear and block nets. Based on these data, Sada (2006) found that populations and standing crop of brown trout remained relatively stable and had longevity and growth rates comparable to other similar high elevation trout streams. The final surveys conducted during 2009 and 2010 determined that fish density had declined to some extent, but that longevity and growth rates were comparable to those in other similar mountain drainages.

SCE conducted additional fish assemblage surveys during September 2019, and June and September of 2020 (SWS 2022a). Sampling methods during 2019 included backpack electrofishing in stream habitats, and gill netting at Bishop Creek Project intake forebays. All sites were sampled to assess fish species, composition, distribution, and condition.

Two of the sampling locations, Sada 3 and Sada 5, were sites that were sampled during 1991-2010 and therefore had strong time series data. Sampling at these sites mimicked methods used by Sada. Comparison of the naturally reproducing brown trout populations at historical monitoring locations indicate that naturally reproducing brown trout populations at the Sada 5 and Sada 3 sample sites are generally similar to levels documented during monitoring from 1991 through 2010 with some variation. Backpack electrofishing at these two sites included multiple-pass depletions, for a comparison of data across years. Fish species collected during these assessments are included in Table 8.5-5. Sampling locations are identified above in Figure 8.5-1.

Table 8.5-5. Fish Species Collected During 2019 Fish Assemblage Surveys in Bishop Creek Reaches

Species	Sada 5	Sada 3	South Fork	Cardinal	Intake 4	Intake 5
Brown Trout	186	103	45	145	2	7
Rainbow Trout	8	10	3	1	1	4
Brook Trout	0	0	0	0	0	1

Source: SWS 2022a

Backpack electrofishing at two additional locations (Middle Fork and South Fork of Bishop Creek) included single-pass methods targeting low-gradient pool-run habitat. Although the primary purpose of these additional sites was to detect potential colonization by Owens sucker escaping from the reservoirs, sampling characterized trout populations in the two forks. Three fish species were observed across sampling locations: brown trout, rainbow trout, and brook trout. No Owens sucker were observed, suggesting that this species is neither abundant nor naturally reproducing downstream of Lake Sabrina. Brown trout were the dominant species across locations, although a few rainbow trout were collected at all sites (Table 8.5-5). Most trout were YOY up to age 3, with a few fish aged 4 or older. The Sada 3 site had brown trout as old as 7+ years. Aging and length-frequency results suggested that unfavorable conditions in 2018 may have limited recruitment of that year class. Additionally, rainbow trout less than 100 mm resembling parr (young trout) were observed at the Sada 5 site, suggesting that some natural reproduction of rainbow trout may be occurring in this reach. Brown trout reproduction was evident across sites, and brown trout densities were similar to those observed during 1991 to 2010 sampling efforts. Brown trout condition factors were within the range that is considered healthy for trout populations in Sierra Nevada mountain streams (SWS 2022).

SCE's reservoir sampling methods during 2020 included nighttime boat electrofishing and beach seining surveys, as well as gill netting surveys (SWS 2022b). The objective of electrofishing surveys conducted during June 2020 were primarily to document the presence or absence of Owens sucker at Lake Sabrina and South Lake. These surveys were timed to be conducted during peak spawning season, to increase the likelihood of fish capture. Standard beach seining methods were used in both reservoirs, although suitable seine locations (e.g., shallow water free of obstructions such as large rocks and woody debris) were rare in both reservoirs; therefore, boat electrofishing was the primary method for Owens sucker surveys. June and September 2020 boat electrofishing surveys were conducted to document the overall fish assemblages in Lake Sabrina and South Lake. Gill netting was utilized to characterize the fish assemblage in two intake forebay impoundments, and to characterize the trout population in Longley Lake (Table 8.5-6). These forebays, which provide pockets of lentic habitat throughout the creek, are shallow ponds that provide refugia for larger adult brown rainbow and brook trout. In addition to gill netting and boat electrofishing surveys, reservoir bathymetry was mapped using vessel-mounted, single beam echo-sounder systems from July 27 to August 6, 2020 to assess existing fish habitat in both reservoirs (Volume 3 of this DLA).

Table 8.5-6. Fish Species and Number Captured During 2020 Reservoir Sampling Efforts

Family	Scientific Name	Common Name	Lake Sabrina		South Lake		Longley Lake	Total
			June	Sept.	June	Sept.	Sept.	
Salmonidae	*Salmo Trutta*	Brown Trout	1	0	26	31	0	58
	Oncorhynchus mykiss	Rainbow Trout	81	58	128	48	0	315
	Salvelinus fontinalis	Brook Trout	27	19	57	24	27	154
Catostomidae	*Catostomus fumeiventris*	Owens Sucker	105	45	0	0	0	150
Total			214	122	211	103	27	677

Source: SWS, 2022b

8.5.2.1 Abundance, Density, and Biomass of Fish in the Study Area

A total of 677 fish were captured across reservoir sampling efforts (Table 8.5-6). Results suggest that the species composition in South Lake, Lake Sabrina, and Longley Lake are dominated by coldwater trout species. A total of 150 Owens sucker were collected in Lake Sabrina, suggesting that this impoundment supports a large self-sustaining population. Rainbow trout were the most abundant trout species captured in Lake Sabrina and South Lake, likely because of frequent stocking. Brook trout were the only species collected during gill netting near the forebay intakes at Longley Lake (Table 8.5-6) (SWS 2022b). Catch-per-unit-effort (CPUE) for fishes captured during spring and fall showed some variability by gear type, location, and season (Table 8.5-7). Overall, CPUE was fairly similar when comparing similar methods between South Lake and Lake Sabrina, while gill netting in Longley Lake had the highest CPUE.

Table 8.5-7. Fish Catch per Unit Effort by Survey Method During 2020 Reservoir Sampling

Reservoir	Method	Catch per Unit Effort (CPUE)[1] x 1,000				
		Brown trout	Rainbow trout	Brook trout	Owens Sucker	Total
June Sampling Efforts						
South Lake	Daytime Boat Electrofishing	0.07	0.31	0.25	0.00	0.63
	Nighttime Boat Electrofishing	0.16	0.85	0.13	0.00	1.15
	Beach Seine	0.07	0.07	1.13	0.00	1.28
Lake Sabrina	Daytime Boat Electrofishing	0	0.20	0.10	0.25	0.55
	Nighttime Boat Electrofishing	0.01	0.48	0.12	0.64	1.25
September Sampling Efforts						
South Lake	Nighttime Boat Electrofishing	0.28	0.43	0.22	0.00	0.93
Lake Sabrina	Nighttime Boat Electrofishing	0.00	0.69	0.22	0.53	1.44
Longley Lake	Gill Net	0.00	0.00	2.12	0.00	2.12

Source: SWS 2022b

Below the reservoirs, of the two sites sampled in 2019 using multiple-pass electrofishing, trout abundance was higher at the Sada 5 sample site; however, biomass was greater at the Sada 3 sample site. Brown trout, the most abundant species at both sites, were the primary driver of the population estimates. Trout abundance, density, and biomass in Bishop Creek at the Sada 5 and Sada 3 sample sites are summarized by site in Table 8.5-8. Trout abundance and biomass and individual fish data are presented by segment in the Bishop Creek Fish Distribution FTR in Volume 3 of this DLA.

Table 8.5-8. Trout Population Abundance, Estimated Density, and Estimated Biomass at the Sada 5 and Sada 3 Sample Sites, September 2019

Sample site	Site length (m)	Average width (m)	Trout species	Number captured	Biomass (g/m^2)			Density (Trout per mile)		
					Est.	Lower 95% C.I.	Upper 95% C.I.	Est.	Lower 95% C.I.	Upper 95% C.I.
Sada 5	122	6.3	Rainbow	8	0.13	--[a]	--[a]	--[a]	--[a]	--[a]
			Brown	186	5.72	3.89	7.55	2,889	2,032	3,745
			All Trout	194	5.85	5.06	6.65	2,983	2,220	3,747
Sada 3	123	5.1	Rainbow	10	1.58	--[a]	--[a]	--[a]	--[a]	--[a]

Sample site	Site length (m)	Average width (m)	Trout species	Number captured	Biomass (g/m²)			Density (Trout per mile)		
					Est.	Lower 95% C.I.	Upper 95% C.I.	Est.	Lower 95% C.I.	Upper 95% C.I.
			Brown	103	9.08	2.46	15.70	1,354	1,222	1,485
			All Trout	113	10.58	4.00	17.16	1,486	1,334	1,637

CI= Confidence Interval

[a] Depletion pattern and low capture numbers for rainbow trout did not allow for density estimates.

8.5.2.2 Age Class Distribution

During the 2019 sampling effort, brown trout were observed at each sampling location with most fish ranging from YOY up to age 3+ with a few older fish observed. Both sites had fish as old as 4+; the Sada 3 sample site produced brown trout as old as 7+. Length-at-age size ranges based on scale analysis, length frequency distribution, and previously reported values are presented in Table 8.5-9. Ranges of fish lengths for each age class during this study were narrower than the values provided by Walsh and Williams (1991) (Table 8.5-9) and expanded upon in the FTR in Volume 3 of this DLA (SWS 2022a).

Table 8.5-9 Trout Age Based on Length Frequency Histograms and Scale Analysis

Fish Species	Age	Fork Length Range Based on 2019 Scale Analysis (mm)[a]			Fork Length Range Based on Length-Frequency Nodes (mm)[b]	Fork Length Range Reported in Walsh and Williams (1991) (mm)[c]
		Sada 5	Sada 3	Cardinal		
Brown Trout	YOY	--[d]	100	--[d]	< 120	36–103
	1+	100–112	97–100	107–149	90–170	87–219
	2+	178–248	140–172	137–236	130–220	136–327
	3+	250	150–204	167–182	180–250	--
	4+	240	199	--[d]	210–290	--
	5+	--[d]	198–270	--[d]	>290	--
	6+	--[d]	--[d]	--[d]	--	--
	7+	--[d]	289	--[d]	--	--
Rainbow Trout	YOY	--[d]	--[d]	--[d]	--	--
	1+	--[d]	--[d]	--[d]	--	--
	2+	--[d]	170–176	--[d]	--	--
	3+	--[d]	147–174	--[d]	--	--
	4+	--[d]	--[d]	--[d]	--	--
	5+	--[d]	233	--[d]	--	--
	6+	--[d]	--[d]	--[d]	--	--

Fish Species	Age	Fork Length Range Based on 2019 Scale Analysis (mm)[a]			Fork Length Range Based on Length-Frequency Nodes (mm)[b]	Fork Length Range Reported in Walsh and Williams (1991) (mm)[c]
		Sada 5	Sada 3	Cardinal		
	7+	--[d]	--[d]	--[d]	--	--
	8+	--[d]	--[d]	285	--	--

Source: SWS 2022a

[a] Fish were not aged from scales collected at the South Fork, Intake 4, or Intake 5 sample sites.

[b] Distinct nodes were not apparent on the length frequency distribution for brown trout longer than 290 mm FL or for rainbow trout of any size due to low numbers captured.

[c] Brown trout age class data in Walsh and Williams (1991) included YOY, age 1+ and age 2+; no rainbow trout ages were reported.

[d] Scales were not aged from fish in this size class (N. Buckmaster, CDFW, *personal communication*).

Brown trout captured at the Sada 5 sample site were predominately smaller fish, less than 110-mm fork length (FL). Although no scales were aged from brown trout less than 100 mm FL at the Sada 5 sample site, they are expected to fall within the YOY age class based on the length-frequency distribution and scale age data reported in Walsh and Williams (1991). Brown trout within the age 1+ and age 2+ age classes were common but in lower numbers than the YOY age class. A few brown trout longer than 220 mm FL were captured and likely fall within the age 2+ through age 4+ range. The overlap in fish lengths at specific age classes is typically due to variability in individual fish growth rates and is fairly common, especially for older age classes. The greater fish length assigned to age 3+ brown trout compared to age 4+ brown trout is likely due to age-class size overlap and the 8-132 small sample size of scales analyzed from fish in both age classes (n = 1). The largest brown trout captured at the Sada 5 sample site was 299 mm FL and was likely age 5+ or older. The gap in sizes of brown trout observed between 120 mm and 180 mm at the Sada 5 sample site may indicate unfavorable 2018 environmental conditions that limited fish survival or growth or delayed the spawning season. Multiple age classes of brown trout and a high abundance of young fish suggest that brown trout are successfully reproducing within this segment of Bishop Creek. The presence of fish as old as 7+ years indicates that stream conditions are suitable for longevity. The low number of rainbow trout captured at the Sada 5 sample site did not allow for identification of specific age classes; however, the large range in sizes observed suggest at least two age groups were observed. Rainbow trout less than 100 mm FL observed at the Sada 5 sample site suggest that a small population of rainbow trout is reproducing in this section of Bishop Creek.

Scales collected from fish at the South Fork sample site revealed signs of regeneration and/or damage and were therefore considered unreliable for aging. The length-frequency distribution for the South Fork sample site shows very few brown trout in the presumptive YOY and 1+ age classes relative to older age classes, which is atypical for trout populations.

At the Cardinal sample site (Middle Fork), brown trout estimated to fall within the YOY age class were observed in relatively high numbers, with lower numbers of brown trout through age 4+. A single rainbow trout captured at the Cardinal sample site was estimated to be age 8+. The overall length distribution range for brown trout at the Cardinal sample site suggests multiple age classes indicative of a self-supporting population of brown trout. This site is accessible to an active lodge with guest cabins and may be subject to angling pressure.

Lengths of brown trout captured by gillnets in Bishop Creek Project intakes ranged from approximately 160 mm FL to 400 mm FL. Scales collected from fish in Intake 4 and Intake 5 revealed signs of regeneration and/or damage and were therefore considered unreliable for aging. Based on ages observed from other locations in the Bishop Creek watershed, fish captured in the Bishop Creek Project intakes likely ranged from age 1+ up to age 5+ or older.

Fish captured in South Lake were all members of the family Salmonidae, including brown trout, rainbow trout, and brook trout ranging from approximately 50 to 550 mm FL. Brown trout included fish expected to be within all age classes from YOY up to approximately age 3+ ; rainbow trout included fish expected to be within all age classes from YOY to well over age 3+; and brook trout included fish expected to be within all age classes from YOY up to 3+ (SWS 2022a).

Fish captured in Lake Sabrina included fish from the family Salmonidae, including brown trout, rainbow trout, and brook trout ranging from approximately 50 to 650-mm FL, and Owens suckers (family *Catastomidae*) ranging from approximately 70 to 380-mm FL. The size distribution of rainbow trout and brook trout captured in Lake Sabrina indicate multiple age classes are present with some fish from both species expected to fall within the YOY age class. A single brown trout was captured that was approximately 650 mm FL which is expected to be in the 5+ age class or older. Owens suckers likely included fish within all age classes from YOY to age 6+ or older; however, age and growth have not been well documented for this species (SWS 2022b).

Brook trout were the only fish species captured in Longley Lake, and the narrow size distribution makes estimating age structure difficult. The brook trout captured in Longley Lake ranged from 190 to 255 mm FL and the observed sizes likely fall within the 2+ and 3+ age classes, based on size-at-age estimates for brook trout reported by Moyle (2002) and observations in Lake Sabrina. The absence of brook trout less than 190 mm FL is likely a result of the gill net mesh size which is selective for fish larger than 100 mm.

8.5.2.3 Habitat Suitability

Existing minimum flows in Bishop Creek Project bypass reaches were determined during the prior relicensing based on results from an IFIM conducted at the time (Table 8.5-1, above). At the request of CDFW, SCE conducted a new instream flow assessment (AQ 1; Volume 3) during 2019 and 2020 in the Bishop Creek plant bypass reaches, Birch Creek, and McGee Creek. The goal of AQ 1 was to provide data to better analyze effects of Bishop Creek Project operations, including existing minimum flows, on aquatic resources based on updated modeling. A total of 10 study sites were located throughout the various bypass reaches, and one study site each in Birch and McGee creeks, and cross-channel transects were surveyed in each plant bypass reach. Bed profile and calibration velocity measurements were taken at approximately 1-foot intervals on each transect to facilitate modeling of up to approximately 100 cfs. Habitat suitability for juvenile and adult brown trout was generally modeled using PHABSIM across a range of flows bracketing existing minimum flows in each reach[15]. In addition, habitat suitability[16] for native non-game species was modeled in the bypass reaches for Power Plant No. 5 and No. 6 consistent with reach-specific CDFW management objectives. In general, existing flows provided a relatively high level of suitability for brown trout juveniles and speckled dace, with mixed results for other species and lifestages (Kleinschmidt 2022a). In reviewing IFIM (AQ 1) results, CDFW expressed interest in the potential for fish stranding at low flows. Although fish stranding criteria were not specified by agencies as a parameter during IFIM study scoping, SCE concurs that the PHABSIM transect, and hydraulic data were primarily collected in riffle areas where suitable depths for habitat connectivity could theoretically be a potential issue at extreme low flows. SCE is confident that this issue can be resolved jointly in consultation the TWG by using existing hydraulic and survey data as part of the process of identifying any PME measures pertaining to instream flow alternatives. Table 8.5-10 describes the percent of maximum weighted usable area (WUA) that is available across reaches under existing minimum.

Table 8.5-10. Relative Habitat Suitability of Existing Minimum Flows in 10 Bypass Reaches of Bishop Creek, and in Birch and McGee Creeks

Location	Fishery Management Priority	Species	Life stage	Current Min. Flow	Percent Of Max WUA
Intake 6 bypass	indigenous species	speckled dace	adult	1 CFS	unavailable [17]
		Owens sucker	juvenile		
		Owens sucker	adult		
		brown trout	juvenile		
		brown trout	adult		
Intake 5 bypass	indigenous species	speckled dace	adult	18 CFS	41%
		Owens sucker	juvenile		94%
		Owens sucker	adult		41%
		brown trout	juvenile		92%
		brown trout	adult		23%
		brown trout	juvenile		~99%

[15] In a few reaches where PHABSIM modeling was not feasible, empirical measurements were collected at three flows bracketing the existing minimum flows.

[16] SCE defines habitat suitability as the maximum amount of WUA achieved at a flow within the modeled range, in case the peak occurs at a low or intermediate flow within the range modeled. Adult and juvenile life stages have differing WUA peaks.

[17] This PHABSIM model was not accurate at flows less than 4 cfs.

Location	Fishery Management Priority	Species	Life stage	Current Min. Flow	Percent Of Max WUA
Intake 4 bypass (below Coyote Creek)	self-sustaining brown trout	brown trout	adult	5 CFS[18]	~55%
Intake 4 bypass (above Coyote Creek)	self-sustaining brown trout	brown trout	juvenile	5 CFS	98%
		brown trout	adult		85%
Intake 3 bypass	self-sustaining brown trout	brown trout	juvenile	13 CFS	~76%
		brown trout	adult		~16%
Intake 2 bypass (below south and middle forks)	self-sustaining brown trout	brown trout	juvenile	14 CFS	~90%
		brown trout	adult		~97 %
Intake 2 bypass (Middle Fork above South Fork)	self-sustaining brown trout	brown trout	juvenile	7 CFS	80%
		brown trout	adult		11%
Middle Fork (below Lake Sabrina)	self-sustaining brown trout	brown trout	juvenile	13 CFS	93%
		brown trout	adult		23%
South Fork (below Intake 2 diversion)	self-sustaining brown trout	brown trout	juvenile	7 CFS	~99%
		brown trout	adult		~36%
South Fork (below South Lake)	self-sustaining brown trout	brown trout	juvenile	13 CFS	90%
		brown trout	adult		~44%
Birch Creek	indigenous species	speckled dace	adult	0.25 CFS	90%
McGee Creek	indigenous species	speckled dace	adult	1 CFS	100%
		brook trout	adult		87%

Source: Kleinschmidt 2022

8.5.2.4 Anadromous Fish

Bishop Creek rises on the east slope of the Sierra Nevada and is a tributary of the Owens River. The Owens River does not discharge into a larger river or the Pacific Ocean. Therefore, there are no anadromous fish species in the watershed.

8.5.2.5 Catadromous Fish

There are no catadromous fish in the Bishop Creek Project area.

[18] Exclusive of flow contributed by Coyote Creek

8.5.3 Benthic Macroinvertebrates

There are no published studies regarding benthic macroinvertebrates in Bishop, Birch, or McGee creeks. This data gap is not unusual for most of the Sierra Nevada, where invertebrate inventories or studies at the species level are scarce (Erman 1996). Field notes from a study conducted in 1976, provided by the CDFW, indicated an attempt to characterize aquatic invertebrate fauna in relation to water temperature and reach features (e.g., pool, riffle, channel substrate) for ten sites on Bishop Creek extending from below Lake Sabrina to below Power Plant No. 3. The study detected at least ten orders of invertebrates, but many of these were only identified to the family level, not to species. There was no discernible pattern of distribution relative to stream reach. Habitat and flow analyses conducted throughout the Bishop Creek Project reaches documented a homogenous mix of cobble and boulder substrates, with patches of gravel (Kleinschmidt 2022a; 2022b). These would all be suitable substrates for macroinvertebrates. Less suitable substrates, such as silt sand and other fines, are confined to patches along stream banks and downstream of current breaks. These substrate findings are consistent with substrate distributions found during the 2019 IFIM studies at all study sites. These habitat assessments suggest that habitat suitability for macroinvertebrates is not limited (Kleinschmidt 2022a).

8.5.4 Freshwater Mussels

Unpublished field notes from an invertebrate study conducted in 1976 detected taxa from two classes of mollusks (*Gastropoda, Pelecypoda*) in Bishop Creek, but no bivalves or invasive species such as the quagga mussel or zebra mussel were documented.

Quagga and zebra mussels are freshwater bivalves native to Eastern Europe and Western Asia that made their way into the Great Lakes in the late 1980s. They have been highly successful invaders, reproducing and adapting quickly to hundreds of freshwater lakes and waterways in the midwestern and eastern United States. Scattered populations have been detected in southern California (SCE 2017). The mussels have significant adverse impacts to aquatic ecosystems and water delivery systems. The spread of these mussels is believed to be through infected watercraft.

SCE personnel have not reported any sightings or indications of quagga or zebra mussels, but the extensive network of waterways and reservoirs and multiple public access launch ramps and popular recreational sites, presents a potential risk of introduction to SCE's managed water bodies. The New Zealand mud snails are documented in lower reaches of Bishop Creek (below the project) and throughout the Owens River drainage (CDFW, personal communication) and below McLaughlin Creek, approximately 40 miles north of the Bishop Creek Project area (USFS 2013); however, distribution is limited by available calcium, as described below.

SCE developed a quagga and zebra mussel prevention plan to assess the vulnerability of invasion into SCE lakes. The prevention plan includes a monitoring program to detect the presence of adult and/or veliger dreissenid mussels and includes long-term management steps to ensure continued recreational use of healthy SCE lakes.

Management steps include educational outreach to inform the public about the biology and management of the mussels.

Despite the potential for invasive mussel species to be introduced in the Bishop Creek drainage, water quality parameters present in the system are unlikely to support the long-term survival of the species. Specifically, calcium concentrations and pH levels measured in South Lake and Lake Sabrina may be too low to support quagga and zebra mussel life histories. Water quality parameters measured during 2009-2010 in South Lake documented calcium concentrations of 2.41 mg/L, and measurements in Lake Sabrina documented calcium concentrations of 2.61 mg/L (SCE 2017). Quagga and zebra mussels generally require calcium concentrations of at least 12 mg/L for shell formation and long-term survival. Additionally, pH levels in the two reservoirs ranged from 6.99-7.06. Quagga and zebra mussels generally require aquatic habitats with pH levels of at least 7.3 and have better survival in habitats that provide pH levels greater than 7.8 (SCE 2017). Thus, the risk of invasive mussel establishment in the Bishop Creek system is low.

8.5.5 Potential Adverse Effects and Issues

The Bishop Creek Project reaches currently have minimum flows in place to ensure suitable habitat for brown trout and other fish species, as shown above. Reach 1 (i.e., below intake no. 6) has no flow requirement, but SCE has historically provided a minimum of 1 cfs.

While CDFW does not have specific fishery management metrics, the general objectives are to provide a self-supporting brown trout fishery between the reservoirs downstream to Power Plant No. 4, and support populations of indigenous nongame species between Power Plant No. 4 and No.6 as well as in Birch and McGee creeks. CDFW indicates that the applicable management objective is to provide adequate habitat suitability. The term “adequate habitat” can be defined on a case-by-case basis by a combination of the following scientific and measurable characteristics: stream flow, water quality, food sources, physical habitat, and biotic interactions (CDFW June 21, 2021 letter to SCE). Overall, the reaches of Bishop Creek provide adequate habitat quality for a variety of species and lifestages.

These reaches are generally characterized by greater than 50 percent of maximum habitat suitability for juvenile brown trout, brook trout and dace. In the higher gradient reaches adult brown trout habitat suitability is limiting under existing flow conditions. This reflects conditions where the shallow and steep nature of the stream results in inherently shallow depths at all flows. Based on the Habitat Suitability Index (HSI) criteria selected by the TWG for the adult lifestage, as depths in these reaches increase in suitability, the concurrent increase in velocity becomes less suitable. Thus, the hydraulics in some reaches are inherently limiting to adults based on the HSI. Larger brown trout tend to prefer low gradient pools and runs rather than higher gradient riffles and cascades. This is consistent with the larger sized adults that were captured in the intake pools as well as in low gradient reaches of the South and Middle forks in the creek fish survey. Based on creek fish data, it should be noted that the relatively small sizes of adult brown trout in these high gradient stream habitats are similar in length to juvenile brown trout in other systems from which HIS criteria are derived. This suggests that juvenile HSI criteria are potentially more reflective of habitat preferences for the smaller adult fish found in these reaches, and therefore the WUA curves for juvenile brown trout are a reasonable index of habitat suitability in the higher gradient reaches.

Current operations would continue to maintain existing habitat in impoundment and downstream reaches for salmonid species, as well as native species. Continued operation with implementation of minimum flow measures is not expected to have new, significant adverse effects on existing aquatic resources, and would maintain existing habitat.

The following sections address potential effects as identified by the TSP and SD1 (Table 8.1-1). Based on the completed studies, and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action.

8.5.5.1 Potential Impacts of Project Operation and Maintenance on Fish Populations and Distribution in Project Reservoirs

Results from SCE's 2020 sampling demonstrates that Bishop Creek Project reservoirs are dominated by cold water trout species. Rainbow trout was the most abundant trout species captured in Lake Sabrina and South Lake, likely as a result of frequent stocking (Table 8.5-6). Lake Sabrina supports a self-sustaining population of Owens sucker, though this species is not believed to have colonized other Bishop Creek Project waters. Owens sucker are not native to the reservoir; this population resulted from an unsanctioned introduction. Brown trout observed in the study area appear to be naturally reproducing and self-sustaining (SWS, 2022).

SCE does not propose to make changes to water level operations of Bishop Creek Project reservoirs (Lake Sabrina and South Lake). The changes in water levels in response to flow requirements do not appear to negatively impact the fishery resources of the reservoirs.

Rainbow trout is the predominant species in Bishop Creek Project reservoirs, and abundance is primarily a function of put and take stocking, and angling exploitation. Thus, the abundance of adult trout in the reservoirs is arbitrary and a function of recreational fishery management. Although there is evidence of some limited incidental natural reproduction, there is no self-sustaining population and management of this fishery is not dependent on recruitment from natural reproduction; residency time for most stocked rainbow trout in the reservoirs is believed to be very short (N. Buckmaster, CDFW, personal communication, June 2018). Qualitative data showed that a large portion of rainbow trout (53 percent in Lake Sabrina and 57 percent in South Lake) appeared to be of hatchery origin, with 27 percent to 30 percent identified as unknown origin, and 14 percent to 18 percent appeared to be wild. Information on recruitment is also available in the Length-Frequency histograms provided in the Bishop Creek Reservoir Fish Distribution Study FTR (Volume 3 of this DLA).

The population of Owens sucker in Lake Sabrina is not native to this water body, and the species was not observed elsewhere in the watershed. Evidence collected during the reservoir fishery survey indicates that the population is self-sustaining under existing reservoir operating conditions. Suitability mapping for sucker habitat in Bishop Creek Project reservoirs was outside of the scope of the FERC approved study plan; however, general habitat availability can be assessed from the bathymetry figures included in the Bishop Creek Reservoir Fish Distribution Study FTR. The bathymetry figure for Lake Sabrina (Bishop Creek Reservoir Fish Distribution Study, Volume 3) shows that shoal areas with low gradients that likely provide suitable spawning habitat extend well beyond the lake margins, especially along the north shore of the reservoir, and available habitat is likely to be suitably submerged under a range of water surface elevations that occur during the June spawning season.

A large and robust population of Owens sucker was observed in Lake Sabrina while no Owens sucker were observed during this study at South Lake. In Lake Sabrina, spawning behavior was observed with Owens sucker congregating in large groups along sand and gravel substrate along most of the reservoir shoreline, and redds were observed within the back of coves at the southern end of the reservoir. Owens sucker spawning typically occurs during the late spring and early summer when reservoir levels are rising and the spawning shoal habitats are inundated. Current and proposed reservoir operations appear to be supporting a healthy population.

Based on results of the fish and aquatics studies as described above and the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no potential impacts of Bishop Creek Project O&M on fish populations and distribution in Project Reservoirs.

8.5.5.2 Potential Impacts of Project Operation and Maintenance on Fish Population Distribution in Bishop Creek

The primary goal of the Bishop Creek Fish Distribution Baseline Study (AQ 3) was to acquire information on the current distribution of game and non-game fish species of interest and the growth and density of wild brown trout populations in the Bishop Creek Project area.

CDFW provided additional material, including the *Strategic Plan for Trout Management: A Plan for 2004 and Beyond*, which did not include specific guidance on reach-based assessments. SCE will incorporate a discussion of relevant CDFW management goals if a copy or citation is provided prior to the development of the FLA. SCE reviewed Bishop Creek Project operation data for the past 5 years and noted no flow regime deviations within the two historic survey reaches. Any changes to MIF or flow variances will be reported in the FLA, utilizing the Operations Model to detect any systematic issues with meeting the current MIF requirements. Summarized results of this study are provided in the following text. Preliminary results of the AQ 3 study were filed with the ISR in November 2020, submitted to the TWGs in early 2021, and FTRs are provided in Volume 3 of this DLA.

CDFW hypothesized that the existing flow regime may be limiting the growth of brown trout in riverine reaches. It is worth noting that wild riverine fish populations are rarely perfectly stable and population metrics routinely increase or decrease naturally over time due to varying environmental, ecological or angling pressure factors.

Brown trout populations in Bishop Creek Project reaches would have adapted to the habitat-based flows initiated under the current License in 1994. The subsequent wild riverine fish populations would be expected to increase and decrease naturally over time as they are already established in regard to varying environmental, ecological, or angling pressure factors.

Both the biomass and density estimate at the Sada 3 Study Site for 2010 and 2019 are lower than estimates from 1991, 1992, and 2004; however, it is unclear whether the differences in biomass are either statistically significant or related to Bishop Creek Project operation. While the density estimates at the Sada 3 Study Site were lower in 2019 compared to estimates from 1991, 1992, and 2004, results from the t-test analysis indicate there is no significant difference between the population size in 2019 compared to prior years. Additionally, while the biomass estimates for 2019 is lower compared to 1991, 1992, and 2004, individual fish sizes were actually larger in 2019 compared to prior years based on the average length and weight for brown trout captured. Biomass values reported from previous studies do not include sufficient detail (i.e., standard error) to perform a t-test to evaluate whether differences in biomass between sample years are statistically significant; however, given the population densities and individual fish sizes, the population does not appear to be statistically different from prior years. The presence of a number of relatively long-long lived individuals was detected in the surveyed brown trout populations, suggesting that suitable interannual conditions consistently persist.

Water quality conditions observed during this study are suitable for brown trout with high oxygen levels, cold water temperatures, and suitable pH levels. Although water temperatures may be slightly cooler than optimal, thus limiting brown trout growth, they do not appear to be having an adverse effect on the overall health of the brown trout population or its distribution within the study area.

Results from this study suggest that there is a healthy, naturally reproducing population of brown trout in the study area, which is in line with the desired conditions described in the Land Management Plan for the INF (USDA 2019) as they relate to ecological sustainability and diversity of plant and animal communities (FTR in Volume 3 of this DLA).

As there are no changes in operations currently planned, SCE has not identified Bishop Creek Project effects under the Proposed Action. Results from the AQ 3 study indicate that reaches have potential to meet alternate management objectives as may be proposed by resource agencies.

8.5.5.3 Potential Impacts on Resident Fish and Aquatic Habitat in Project Affected Stream Reaches, including Current Minimum Instream Flow Releases and Channel Maintenance

The existing habitat-based minimum flows below each intake were established through studies and modeling conducted during the prior relicensing and were intended to be protective of habitat suitability for wild brown trout. An IFIM study (AQ 1) was conducted at the request of the CDFW and USFS to assess current flow needs with newer data.

The AQ 1 study quantified habitat suitability for aquatic species recommended by CDFW and USFS throughout the Bishop Creek Project area by employing a PHABSIM model, based on CDFW stated management goals, which reference a desire for adequate habitat suitability. The PHABSIM model generates a HSI referred to as WUA.

As previously discussed, specific criteria for defining adequate habitat suitability has not been provided; however, "adequate" is distinguished from "optimum" or "maximum", especially when needing to balance multiple life stages and species. In certain study reaches and at some flow ranges, WUA curves among species and life stages conflict; however, there are numerous techniques for balancing flow recommendations in such cases. Conceptually "adequate" suitability falls between "optimal/maximum" and "unsuitable/minimum" suitability. WUA curves among species and life stages conflict; however, there are numerous techniques for balancing flow recommendations in such cases.

Based on results of the fish and aquatics studies as described above and because the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no potential impacts on resident fish and aquatic habitat in Bishop Creek Project affected stream reaches, including current minimum instream flow releases and channel maintenance.

However, recognizing resource agencies may have management goals for the Bishop Creek Project area, SCE intends to continue working with Fish and Aquatics TWG after filing of this DLA to discuss specific WUA balancing methodology. Where necessary for reach-specific solutions utilizing the Operation Model developed in AQ 2 (Volume 3) to ascertain analyze operational constraints, flow adjustments could be evaluated.

For purposes of AQ 1 study, SCE defines maximum habitat suitability as the maximum amount of WUA achieved at a flow within the modeled range, in cases where the peak occurs within the range modeled. SCE notes CDFW's general comment that stated, "*most of the brown trout weighted usable area curves do not reach their peak in the narrow range of flows that were simulated*". This is partially correct, and primarily applies to the adult life stage only within certain reaches. The AQ 1 FTR confirms that juvenile brown trout WUA peaks at flows within the model range in all except two study reaches, and most commonly at flows at the lower end of the modeled range. In all cases, habitat suitability for juvenile trout increased only slightly throughout the higher range of flows. Adult WUA peaks in three of the study reaches within the flow range, and the data generally show that of the remaining reaches, incremental gains in adult WUA at flows greater than 25-50 are very slight up to 100 cfs. Table 8.5-11 summarizes the percentage of maximum WUA provided in each reach by the existing minimum flows.

Table 8.5-11. Percent of Maximum Habitat Suitability of Target Species and Life Stages Provided by Existing Minimum Flows in Each Reach of the Bishop Creek Study Area

Study Reach	Owens Sucker		Brown Trout		Owens Speckled Dace	Brook Trout
	Juvenile	Adult	Juvenile	Adult		
Reach 1 (below intake 6)	-	-	-	-	-	-
Reach 2 (below intake 5)	**94**	41	**92**	23	43	-
Reach 3 (below Coyote Crk)	-	-	**99**	55	-	-
Reach 4 (below intake 4)	-	-	**98**	85	-	-
Reach 5 (below intake 3)	-	-	**76**	16	-	-
Reach 6 below S. and Middle Fork confluence)	-	-	**90**	97	-	-
Reach 7[1] (below intake 2)	-	-	**69**	13	-	-
Reach 7[2] (below intake 2)	-	-	**65**	7	-	-
Reach 8 below Lake Sabrina	-	-	**95**	27	-	-
Reach 8[3] Below Lake Sabrina	-	-	**85**	50	-	-
Reach 9 below S Fork diversion	-	-	**96**	46	-	-
Reach 10 Below South Lake	-	-	**90**	45	-	-
Birch Creek	-	-	-	-	**90**	**76**
McGee Creek	-	-	-	-	**100**	**87**

1 April – October
2 November – April
3 Braided Channel. This habitat was analyzed using the Habitat Criteria Method (HCM) approach.

Based on SCE's understanding of CDFW management objectives, the following summaries discuss habitat suitability for a variety of species within the Bishop Creek Project reaches.

BISHOP CREEK REACH 1 (BELOW INTAKE 6)

Results from SCE's Fish Distribution Baseline Study (AQ 3 and AQ 4) indicate that self-sustaining brown trout populations occur in segments of Bishop Creek below Bishop Creek Project reservoirs and bypass reaches. Although no Owens suckers or Owens speckled dace were detected in the Bishop Creek, the management priority for the two lowermost reaches (below Intakes 5 and 6) is for native species (represented by Owens sucker and Owens speckled dace), according to CDFW.

BISHOP CREEK REACH 2 (BELOW INTAKE 5)

Results from AQ 3 in Reach 2 indicate that no native species (i.e., Owens suckers or Owens speckled dace) were detected, however, a self-sustaining brown trout population occurs in the reach. Under existing operations, flow in this reach is maintained at 18 cfs providing very good nursery habitat for most species, including 94 percent of maximum habitat suitability for juvenile Owens sucker, 41 percent for adult Owens sucker, 92 percent for juvenile brown trout, 23 percent for adult brown trout and 43 percent of maximum habitat suitability for Owens speckled dace (Kleinschmidt 2022a).

BISHOP CREEK REACH 3 (BELOW BOTH THE CONFLUENCE WITH COYOTE CREEK AND INTAKE 4)

Reach 3 is in a relatively inaccessible part of Bishop Creek. CDFW's management priority for this reach is for self-sustaining brown trout; therefore, only brown trout were included in the flow needs assessment for this reach. Under existing operations, flow in this reach is released at the Intake No. 4 spillway and is supplemented by unregulated discharge from Coyote Creek. Overall, this reach has poor public access and provides relatively limited habitat suitability for brown trout at any flow. However, current operational flows provide 99 percent of the available maximum habitat suitability for juvenile brown trout and 55 percent for adult brown trout (Kleinschmidt 2022a).

BISHOP CREEK REACH 4 (BELOW INTAKE NO. 4 AND ABOVE THE CONFLUENCE WITH COYOTE CREEK)

Reach 4 is in an extremely inaccessible, high gradient part of Bishop Creek consisting mostly of cascades and plunge pools and is inaccessible to the public. Inflow to this reach results from releases at Intake No. 4. CDFW's management priority for Reach 4 is for a self-sustaining brown trout population. Under existing operations, flow in this reach provides 98 percent of maximum habitat suitability for juvenile brown trout and 85 percent for adult brown trout (Kleinschmidt 2022a).

BISHOP CREEK REACH 5 (BELOW INTAKE 3 SPILLWAY)

Reach 5 is in a publicly accessible part of Bishop Creek. Inflow to this reach is influenced by releases at Intake 3. CDFW's management priority for this reach is brown trout, and generally consists of shallow runs and riffles. Under existing operations, flow in this reach provides 76 percent of maximum habitat suitability for juvenile brown trout and 16 percent for adult brown trout (Kleinschmidt 2022a).

BISHOP CREEK REACH 6 (BELOW THE CONFLUENCE OF THE SOUTH AND MIDDLE FORKS OF BISHOP CREEK)

Reach 6 is in a partially accessible part of Bishop Creek. Inflow to this reach is influenced by releases at both the South Fork diversion and the Intake 2 spillway on the Middle Fork and is comprised of plunge pools, cascades, and steep rapids. CDFW's management priority for this reach is for self-sustaining brown trout populations. Under existing operations, flows in this reach provide approximately 90 percent of maximum habitat suitability for juvenile brown trout and 97 percent for adult brown trout (Kleinschmidt 2022a).

BISHOP CREEK REACH 7 (MIDDLE FORK BELOW THE INTAKE NO. 2 SPILLWAY)

Reach 7 is a high gradient riffle reach in a partially accessible part of Bishop Creek. There are no pools and substrate is boulder-dominated. Inflow to this reach is influenced by releases at the Intake No. 2 spillway on the Middle Fork of Bishop Creek. CDFW's management priority for this reach is for self-sustaining brown trout populations. Under existing operations, flow in this reach is maintained seasonally (May through October) and slightly lowered the rest of the year. The flow maintained May through October provides 69 percent of maximum habitat suitability for juvenile brown trout and 13 percent for adult brown trout; the flow outside these months provides approximately 65 percent of maximum habitat suitability for juvenile and 7 percent for adult brown trout (Kleinschmidt 2022a).

BISHOP CREEK REACH 8 (MIDDLE FORK BELOW THE LAKE SABRINA RESERVOIR)

Reach 8 is in a publicly accessible part of the Middle Fork of Bishop Creek. Inflow to this reach is influenced by releases from the Lake Sabrina reservoir. Habitat in this reach includes both moderate gradient riffle, pools and low gradient braided channels. The TWG chose riffle habitat for PHABSIM modeling. CDFW's management priority for this reach is for self-sustaining brown trout populations. Under existing operations, flow in this reach provides approximately 95 percent of optimal habitat suitability for juvenile brown trout. Adult suitability for brown trout remains limited due to a lack of suitable depths at most flows but rises gradually throughout the flow range (Kleinschmidt 2022a).

BISHOP CREEK REACH 9 (SOUTH FORK BELOW THE SOUTH FORK DIVERSION)

Reach 9 is in a partially accessible part of the South Fork of Bishop Creek. Inflow to this reach is influenced by releases from the South Fork diversion to Intake No. 2. Most of the habitat in this reach is moderate to high gradient shallow riffles. CDFW's management priority for this reach is for self-sustaining brown trout populations. Under existing operations, flow in this reach is seasonally maintained similarly to Reach 7. The shallow fast flow in this reach provides limited overall suitability for brown trout at both life stages. The current seasonal flow maintained from May through October provides 96 percent of maximum habitat suitability for juvenile brown trout and 46 percent for adult brown trout and the flow outside those months provides approximately 100 percent of maximum habitat suitability for juvenile brown trout and 35 percent for adult brown trout (Kleinschmidt 2022a)

BISHOP CREEK REACH 10 SOUTH FORK BELOW THE SOUTH LAKE RESERVOIR)

Reach 10 is in an accessible part of the South Fork of Bishop Creek. Inflow to this reach is influenced by releases from the South Lake reservoir. Modeled habitat in this reach is low gradient runs, although there are also deep riverine pools and scattered riffles. CDFW's management priority for this reach is for self-sustaining brown trout populations. Juvenile brown trout habitat suitability is maximized at 6 to 8 cfs and decreases between at higher flows; as flows increase, velocity becomes progressively less suitable for this lifestage. The existing base flow in this reach provides approximately 90 percent of optimal habitat. Adult suitability for brown trout increases linearly between 4 and 37 cfs and declines at higher flows (Kleinschmidt 2022a).

BIRCH CREEK

Modeled habitat in this reach is moderate gradient alternating run and riffle habitat. CDFW's management priority for this reach is for self-sustaining brook trout and speckled dace populations. Under existing operations, flow in this reach provides 90 percent of maximum habitat suitability for speckled dace and 76 percent for adult brook trout (Kleinschmidt 2022a)

MCGEE CREEK

Modeled habitat in this reach is moderate gradient alternating run and riffle habitat. CDFW's management priority for this reach is for self-sustaining brook trout and speckled dace populations. Under existing operations, flow in this reach provides 100 percent of maximum habitat suitability for speckled dace and 87 percent for adult brook trout (Kleinschmidt 2022a).

8.5.5.4 Potential Impacts of Project Operation and Facilities on Upstream and Downstream Fish Passage, Including Entrainment and Turbine Mortality

There are no anadromous or migratory fish populations within the Bishop Creek Project area. Stream resident brown trout are predominantly localized sedentary populations of brown trout that do not require volitional passage past Project facilities.

A field entrainment study was conducted during the prior relicensing (Biosystems, 1988) that demonstrated that very few fish were subject to entrainment. Following the implementation of increased minimum flows under the existing license, FERC approved (with modifications) a plan to measure entrainment once fish populations stabilized to reflect new, higher flows. The study (EA Sciences, 1997) summarized two previous studies on entrainment and turbine induced mortality on Bishop Creek trout populations and conducted additional sampling using ¼-inch stretch-mesh fyke nets that were custom fit to the tailraces of Power Plants No. 3 and No. 5. These plants were selected because they were representative of the five power plans in the Bishop Creek Project. Results indicated that daily mortality rates were extremely low. Entrainments rates were higher at Power Plant No. 5 than at Power Plant No. 3, with daily mortality rates estimated at 0.356 and 0.07, respectively. Based on these results it was estimated that all five power plants annually remove between 243 to 521 fish (using minimum and maximum confidence estimates for 0.95 confidence limit).

The existing stocking agreement with CDFW was implemented to mitigate for the impacts described by the entrainment analysis; under this agreement, SCE funds the placement of 2500 trout every 5 years into reservoirs as determined by CDFW.

Based on results of literature review described above and because the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no additional potential impacts of Project operation and facilities on upstream and downstream fish passage, including entrainment and turbine mortality on resident fish.

8.5.5.5 Potential Impacts of Continued Project Operation on the Federally Listed Endangered Owens Tui Chub

The Owens-tui chub (*Siphateles bicolor snyderi*) has the potential to occur in the Bishop Creek Project area; and has been reported elsewhere in the Owens River watershed, well downstream from the Bishop Creek Project. Their preferred habitat is slow, low gradient reaches that are not typical of the Project, and fish distribution surveys (AQ 3 and AQ 4) conducted in 2019 did not detect any individuals.

Based on results of literature review and results of fish surveys as described in the Bishop Creek Fish Distribution Study (SWS 2022a; Volume 3) described above and because the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no potential impacts of continued project operation on the federally listed endangered Owens Tui Chub.

8.5.5.6 Potential Impacts of Project Operation and Facilities on Recruitment and Movement of Large Woody Debris and Coarse Sediment on Aquatic Habitat Including Macroinvertebrates.

Overall, the Sediment and Geomorphology Study (Kleinschmidt 2022b) determined that relatively low amounts of LWM was free to mobilize within the bankfull channel. Similarly, the dredged sediment from the intakes did not appear to have substantial volumes of LWM in the sediment. This aligns with the operations staff observations that any LWM in the system generally passes though the impoundments and remains in the bypass reaches of Bishop Creek. They did not report substantial debris blockages of the plant intakes, which would indicate retainment of the LWM in the impoundments and removal of the LWM from the system due to clearing of the intake racks. With the banks of Bishop Creek remaining generally stable over the past years, there is little loss of stream banks, which would provide finer sediment and LWM inputs to the system.

As noted in the Sediment and Geomorphology FTR (Volume 3 of this DLA), the substrate in the bypass reaches of Bishop Creek is generally coarse, with that material being approximately an order of magnitude larger in diameter than the sediment dredged from the intakes. The stream bed material (coarse gravel to boulders) tends to remain in place while the finer sediment (sand to gravel) tends to be deposited in the impoundments given the steep slopes in Bishop Creek and the flow regime. As finer sediment (silt and sand) is generally absent from the bypass reaches of Bishop Creek and the habitat does not appear to be limited for macroinvertebrates, the potential impacts of the Bishop Creek Project on macroinvertebrates are relatively low. The dominant substrates are well scoured and unimbedded, providing abundant interstitial spaces and a large amount of surface area to support aquatic macroinvertebrate insects. The abundance of insectivorous fish (trout) is also an indicator that existing conditions are suitable for aquatic macroinvertebrates.

Based on results of the Sediment and Geomorphology Study (Volume 3) as described above and the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no potential impacts of Project operation and facilities on recruitment and movement of large woody debris and coarse sediment on aquatic habitat including macroinvertebrates.

8.5.5.7 Potential Impacts of Project Operation and Facilities on the Potential Spread of Invasive Mussels to Project Reservoirs

While New Zealand mud snails have been documented in the Owens River drainage, and the Project vicinity, SCE personnel have not reported any sightings or indications of quagga or zebra mussels, nor are there occurrences of quagga mussel or zebra mussel in South Lake or Lake Sabrina. As described in Section 8.5.4 above, both lakes have a low risk of introduction of these two invasive species and a low risk of establishment. The level of risk was determined by analyzing factors such as the number of boat launch facilities, water quality including calcium and pH level, and number of annual visitors (SCE 2017). SCE implements an existing Invasive Mussel Prevention Plan that provides appropriate protection for these lakes.

Based on this analysis and because the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE has identified no potential impacts of project operation and facilities on the potential spread of invasive mussels to Bishop Creek Project reservoirs.

8.5.5.8 Consistency with the Inyo National Forest Land Management Plan

One of the goals of the Bishop Creek Reservoir Fish Distribution Study was to determine whether future Bishop Creek Project facilities and operations are consistent with the desired conditions described in the Land Management Plan for the INF (USDA 2019) as they relate to ecological sustainability and diversity of plant and animal communities.

Results from this study suggest that there is a healthy, naturally reproducing population of brown trout in the study area, which is consistent with the desired conditions described in the Land Management Plan for the INF (USDA 2019). Desired conditions relevant to Bishop Creek Reservoir Fish Distribution Study, and with which the Bishop Creek Project is consistent, include:

- SPEC-FW-DC-01: sustainable populations of native and desirable non-native plant and animal species are supported by healthy ecosystems, essential ecological processes, and land stewardship activities, and reflect the diversity, quantity, quality, and capability of natural habitats on the INF.
- SPEC-FW-DC-05: the INF provides high quality hunting and fishing opportunities. Habitat for non-native fish and game species is managed in locations and ways that

do not pose substantial risk to native species, while still contributing to economies of local communities.

The conditions included in the Land Management Plan focus on ecological sustainability and diversity of plant and animal communities, both native and non-native; however, heavy angling pressure in South Lake and Lake Sabrina likely limit self-sustaining populations of non-native game species (i.e., trout). Both South Lake and Lake Sabrina are managed as put-and-take fisheries where heavy stocking occurs followed by rapid removal from heavy angling pressure. However, these fisheries do appear to be contributing to economies to the local communities as evident by the marinas and resorts associated with South Lake and Lake Sabrina. Furthermore, no native fish were present within this section of the watershed prior to stocking, so no risk is being posed by the presence of non-native game fish species. Therefore, these conditions meet the criteria included in desired condition SPEC-FW-DC-05. Only Longley Lake appears to support sufficient numbers of brook trout to support a sustainable population of non-native game fish. Owens suckers, while not native to the upper Bishop Creek watershed, are native to the Owens River basin and have established a self-sustaining population within Lake Sabrina under existing conditions. These populations meet the criteria included under the desired condition (SPEC-FW-DC)-01.

8.5.6 Proposed Mitigation and Enhancement Measures

SCE proposes to maintain current operations at the Bishop Creek Project and maintain current minimum instream flow requirements. No new facilities are proposed. For this reason, there are no new PME measures being proposed as part of the DLA; however, SCE anticipates continuing exiting measures for protecting resources (Appendix A, Volume 2) as follows:

- PME-1: Instream Flow Measures
- PME-2: Stream Gaging Plan
- PME-4: Stocking Program
- PME-10: Invasive Mussel Prevention Plan

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8.6 UPLAND WILDLIFE AND BOTANICAL RESOURCES

This section summarizes the affected environment for upland wildlife and botanical resources that have the potential to occur in the Bishop Creek Project area. This discussion is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (see Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of Bishop Creek Project effects.

For the purposes of this study, the Bishop Creek Project area is defined as the FERC Project boundary. The study area consists of Bishop Creek Project facilities, including power plants, dams, diversions, lakes and other impoundments, the flowline starting at Intake No. 2, other outbuildings, and access roads, and a 500-foot survey buffer surrounding each of the above listed Project components.

8.6.1 UPLAND BOTANICAL RESOURCES

The discussion in this section is based on descriptions from the USFS's Classification and Assessment with Lands at of Visible Ecological Groupings System (CALVEG)[19] (USFS 2019). This nomenclature of the plant communities is use by the INF and is used here to be consistent with the INF Plan (USDA 2019). In the CALVEG system, differences between plant community types (also referred to as alliances) are based on canopy cover as determined from aerial photography and satellite imagery. Appendix E (Volume 2) includes maps depicting the plant communities within a 500-foot buffer around Bishop Creek Project facilities, creeks and lakes. Table 8.6-1 lists all terrestrial plant community types, acres occupied, and as percentages of the total mapped area. The dominant upland plant community types within the mapped area are basin sagebrush (covering 13.91 percent of the mapped area), blackbrush (10.55 percent), and bitterbrush (*Purshia tridentata*) (7.98 percent) (USFS 2019). Riparian and wetland plant communities are discussed in Section 8.7 – Wetlands, Riparian, and Littoral Resources.

[19] The CALVEG ("Classification and Assessment with Landsat of Visible Ecological Groupings") system was initiated in January 1978 by the Region 5 Ecology Group of the U.S. The Calveg team's mission was to classify California existing vegetation communities for use in statewide resource planning considerations. It is a hierarchical classification originally based on "formation" categories: forest, woodland, chaparral, shrubs and herbaceous in addition to non-vegetated units. They were originally identified by distinctions calculated among canopy reflectance values used in the LANDSAT satellite. Since then, the classification has been expanded from an initial 129 types occurring throughout the eight regions of the state to the current 213 occurring in nine regions, and image resolution has been enhanced.

Table 8.6-1. Summary of Terrestrial Plant Community Types and Acreages within the Bishop Creek Project Area, including a 500-foot Buffer

Map Label and Name	Total Polygon Count	Total Acres	Percent of Mapped Area
Upland Communities			
AC - Alpine Grasses and Forbs	3	15.07	0.24%
AX - Alpine Mixed Scrub	3	11.77	0.19%
BA – Barren	6	143.06	2.31%
BB – Bitterbrush	23	494.03	7.98%
BC – Saltbush	2	14.59	0.24%
BM - Curlleaf Mountain Mahogany	28	233.73	3.78%
BQ - Great Basin Mixed Scrub	13	290.84	4.70%
BS - Basin Sagebrush	51	860.74	13.91%
BZ - Great Basin - Desert Mixed Scrub	13	290.84	4.7%
DA – Blackbush	7	653.33	10.55%
EP - Eastside Pine	43	230	3.72%
HG - Annual Grasses and Forbs	3	6.57	0.11%
HM - Perennial Grasses and Forbs	2	0.04	0.04%
LP - Lodgepole Pine	46	279.64	4.52%
NQ - High Desert Mixed Scrub	7	405.28	6.55%
PJ - Singleleaf Pinyon Pine	21	287.71	4.65%
PL - Limber Pine	14	40.21	0.65%
QC - Canyon Live Oak	1	1.02	0.02%
SA - Subalpine Conifers	21	158.05	2.55%
WB - Whitebark Pine	10	32.20	0.52%
Subtotal, Upland Communities	*620*	*2414.91*	*71.04%*
OTHER			
IB - Urban-related Bare Soil	7	56.01	0.90%
IW - Urban or Industrial Impoundment	1	2.77	0.04%
Subtotal, Other	*45*	*32.35*	*0.94%*
Grand Total, All	**437**	**6189**	**100%**

Source: USFS 2019, Summarized from maps found in Appendix E (Volume 2)

8.6.1.1 Field Surveys and Methods

Botanical field surveys were conducted throughout the Bishop Creek Project's botanical study area in June and August of 2019 and 2020 (Psomas 2021a, 2021b), as described in the approved study plans for TERR 1, TERR 2 and TERR 3 (Volume 3, Final Technical Reports). The surveys were floristic in nature and consistent with the protocols created by the CDFW (CDFW 2018a). The botanical study area includes Bishop Creek Project facilities and recreational areas plus a 500-foot buffer. Field surveys included an inventory of special status plants and invasive plants. Typical transects consisting of walks along straight lines were not appropriate and were not used; however, surveys were conducted in a manner that ensured 100 percent visual coverage of the study area. All plant species observed were recorded in field notes and a complete list of all species observed in the survey area was created. Any special status plant species observed were mapped and data for species with a CRPR of 1 or 2 were collected on the number and phenology of individuals (estimated for large populations) during the 2019 and 2020 surveys are listed in Appendices A and B of the TERR 2 Final Technical Report (FTR included in Volume 3 of this DLA.

In 2019, surveys were conducted after riparian monitoring required under the existing license was completed, to take advantage of botanists already in the field. Following the guidance in the Final Technical Study Plan for TERR 2 (SCE 2019a), surveys around higher elevation facilities (i.e., Longley Lake) were limited to one-time observational reconnaissance because no invasives were observed in the monitored reaches below the McGee Creek diversions.

8.6.1.2 Plant Communities Identified from Surveys

Plant communities found within the Bishop Creek Project area during field surveys include tree dominated, shrub dominated, herbaceous dominated and other, which include those that fall outside of previously listed communities. The discussions of these communities that follow are based on information reviewed for the Bishop Creek PAD (SCE 2019b).

TREE DOMINATED

Tree-dominated communities are those in which tree cover is in the range of at least 50 to 75 percent.

CANYON LIVE OAK

With a canopy cover of at least 50 percent, the canyon live oak (*Quercus chrysolepis*) community generally occurs on relatively dry, shallow colluvial soils in steep canyons between approximately 1600 feet and 8400 feet. Understory shrubs can include deerbrush (*Ceanothus integerrimus*) and whiteleaf manzanita (*Arctostaphylos viscida*), as well as annual grasses and forbs.

EASTSIDE PINE

This community is defined by the presence of Jeffrey pine either alone or in combination with ponderosa pine (*P. ponderosa*), with a canopy cover of at least 75 percent. The community generally occurs at moderate to upper montane elevations, especially in an elevation range of approximately 5,400 feet to 10,000 feet.

LIMBER PINE

With a canopy cover of at least 75 percent, the limber pine (*Pinus flexilis*) community is associated with dry, steep, high elevation sites generally in the range of 8,000 feet to 10,600 feet. These slopes are often east facing, eroded, rocky, coarse-textured, and with low soil nutrient levels.

LODGEPOLE PINE

The lodgepole pine (*Pinus contorta* ssp. *murrayana*) alliance, with at least 75 percent canopy cover of this species, generally occurs at elevations from approximately 5,800 feet to 11,200 feet. Lodgepole pine is an important invader species following fire or disturbance.

SINGLELEAF PINYON PINE

With a canopy cover of at least 75 percent, the singleleaf pinyon pine (*Pinus monophylla*) community typically occupies dry slopes within a wide elevation range. Understory shrub species commonly include big sagebrush (*Artemisia tridentata*), bitterbrush, cacti (*Opuntia* spp.) and rabbitbrush (*Chrysothamnus* spp.).

SUBALPINE CONIFERS

A combination of two or more conifer species, with a canopy cover of at least 50 percent, comprises this community. Depending on location, the mixture may include three or more of the following species: mountain hemlock (*Tsuga mertensiana*), lodgepole pine), limber pine, and/or whitebark pine (*Pinus albicaulis*). The elevation range of this community is approximately 7,600 feet to 11,800 feet.

WHITEBARK PINE

With a canopy cover of whitebark pine of at least 75 percent, this community occurs on high windswept ridges within an elevation range of 8,600 feet to 12,000 feet. In these areas, a krummholzed form is common, but an upright form also grows in areas of glacial scouring where soil development is poor. Whitebark pine is currently considered a Species of Conservation Concern (SCC) by the INF.

SHRUB DOMINATED

ALPINE MIXED SCRUB

Alpine Mixed Scrub communities consist of a mixture of tall and dwarf shrubs and some low graminoid and forb species, often including cushion or rosette-leaved plants that survive harsh climatic conditions above timberline. In the Sierra Nevada, the Alpine Mixed Scrub Alliance has been mapped chiefly in the range of approximately 8,000 feet to 12,600 feet. Common shrubs include creambush oceanspray (*Holodiscus discolor*), Greene's goldenweed (*Ericameria greenei*) and mountain white heather (*Cassiope mertensiana*). Shrubby willows (*Salix* spp.) are also common in this type. Non-shrub species include those represented in the Alpine Grasses and Forbs Alliance.

BITTERBRUSH

Bitterbrush is dominant in this alliance and can include the varieties antelope bitterbrush (*P. t.* var. *tridentata*) and desert bitterbrush (*P. t.* var. *glandulosa*). The alliance has been mapped at elevations from approximately 4,800 feet to 8,000 feet. Bitterbrush is a high value forage species that is associated with species such as big sagebrush, singleleaf pinyon pine, and Jeffrey pine.

Blackbush

This community is defined by occurrence of blackbush (*Coleogyne ramosissima*) with a canopy cover of at least 50 percent. Other upland shrubs, especially Mormon tea (*Ephedra* spp.), white bursage (*Ambrosia dumosa*) and saltbush (*Atriplex* spp.) may be present.

Curlleaf Mountain Mahogany

This community occurs on gently to steeply sloping mountain uplands and ridge tops, usually in association with rocky outcrops. Curlleaf mountain mahogany (*Cercocarpus ledifolius*) has been mapped more frequently in its shrub form than as a tree in the southern Sierras. It is abundant mainly at elevations above approximately 5,400 feet.

Great Basin Mixed Scrub/Big (Basin) Sagebrush

A mixture of common Great Basin shrubs, with big basin sagebrush (*Artemisia tridentata* ssp. *tridentata*) cover of at least 50 percent, defines this type. It commonly occurs in the range of approximately 5,000 feet to 10,600 feet in the southern Sierras. Other species can include mountain sagebrush (*A. t.* ssp. v*aseyana*), bitterbrush, curlleaf mountain mahogany, currant (*Ribes* spp.), snowberry (*Symphoricarpos* spp.) and/or interior rose (*Rosa woodsia*).

High Desert Mixed Scrub

This mixture of shrub species, found up to approximately 7,400 feet, is defined by the presence of abundant (but not dominant) ephedra species, especially green ephedra (*Ephedra viridis*), spiny menodora (*Menodora spinescens*) and horsebrush (*Tetradymia* spp.).

Rabbitbrush

This community occurs on dry slopes and flats that are dominated by various species of rabbitbrush. In the Sierra Nevada it occurs chiefly within an elevation range of approximately 2,600 feet to 9,000 feet, often in proximity to the Annual Grasses and Forbs Alliance.

Saltbush

This alliance is a combination of shadscale (*Atriplex confertifolia*), four wing saltbush, and/or other *Atriplex* species. It generally occurs at elevations of approximately 3,000 feet to 5,000 feet. Other alkaline desert shrub species such as rabbitbrush can be closely associated with this type.

HERBACEOUS DOMINATED

ALPINE GRASSES AND FORBS

Prostrate or low-growing herbaceous species predominate in this botanically diverse community rather than shrubs or trees. The community occurs most often within an elevation range of approximately 8,200 feet to more than 13,000 feet. Due to high evaporative potential, the short growing season, and abrasion or desiccation by wind, morphological adaptions by particular species are often similar to those in the desert. For example, several cushion-forming plants occur within these rocky sites, as well as species with basal rosette-type leaves. Nevertheless, there are a rich variety of herbaceous species that may be found in this alliance, partially due to diverse habitats and moisture. On dry, open fell-fields, phlox (*Phlox condensata*) often dominates a site, and on granite and metamorphics, oval-leaved buckwheat (*Eriogonum ovalifolium*) is a prominent species in many areas. Other species that may be identified in this community include prostrate sibbaldia (*Sibbaldia procumbens*), knotweed (*Polygonum davisiae*), buttercup (*Ranunculus eschscholtzii*), rockcress (*Arabis lemmonii*), mountain sorrel (*Oxyria digyna*), pussypaws (*Calyptridium umbellatum*), Indian paintbrush (*Castilleja lemmonii*), and (on moist sites) columbine (*Aquilegia pubescens*).

ANNUAL GRASSES AND FORBS

This community is dominated by annual grasses such as bromes (*Bromus* spp.), needlegrass (*Achnatherum* spp.) and wild oats (*Avena* spp.), as well as forbs such as owl's clover (*Orthocarpus* spp.), fiddleneck (*Amsinckia intermedia*) and stork's bill (*Erodium* spp.). This community is often associated with burn areas, xeric, or disturbed conditions. Some of the species (brome, wild oat, stork’s bill) are not native and invasive.

PERENNIAL GRASSES AND FORBS

This community consists of at least 50 percent cover of perennial grasses and forbs, retaining some moisture in mid-summer and growing in an elevation generally within approximately 6,400 feet to 12,000 feet. Upper elevations are often associated with subalpine conifers such as whitebark pine and lodgepole pine.

OTHER PLANT COMMUNITIES

The following categories are part of the above referenced CALVEG system but are not in either the upland or riparian plant community categories.

BARREN

These areas consist of naturally barren landscapes, such as cliffs and bedrocks, where there is less than 50 percent vegetation cover.

URBAN

These areas consist of areas classified as urban-related bare soil and urban or industrial impoundment. Together these areas comprise approximately 32 acres, or approximately

1 percent of the mapped area. Urban-related bare soil consists of dry urbanized or developed lands where at least 50 percent of the area is unvegetated. The “urban or industrial impoundment” is limited to a sewage treatment pond north of the Birch-McGee flowline (SCE 2019b).

8.6.1.3 Non-Native Invasive Plants

The survey areas for invasive plants was smaller than the Bishop Creek Project area, focusing primarily on Project facilities and recreation areas, as well as a reach upstream of Power Plant No. 4 which focused on black locust (*Robinia pseudoacacia*).

Information on non-native invasive plants (NNIPs) potentially occurring in the Bishop Creek Project vicinity was obtained from the California Invasive Plant Inventory (Cal-IPC). Cal-IPC defines NNIPs as plants that 1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (Cal-IPC 2017). These species range from annuals (growth and reproduction in one year) to perennials (growth and reproduction over many years) and include a wide range of growth forms, from grasses to forbs, shrubs, and trees.

Cal-IPC categorizes NNIPs as high, moderate or limited, according to the degree of ecological impact in California (Cal-IPC 2017).

- **High** – Severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

- **Moderate** – Substantial and apparent, but generally not severe, ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

- **Limited** – Invasive but ecological impacts are minor on a statewide level (or not enough information to justify a higher score). Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Cal-IPC was queried to obtain a list of NNIPs based on two parameters:

- Jepson region: The NNIP uses geographic floristic provinces and subdivisions within California as described by the Jepson Manual (Hickman 1993).

- Habitat types: Based on a comparison with vegetation alliances within 1 mile of the Bishop Creek Project, three habitat types were selected: grassland, riparian and woodland habitat.

The query of the Cal-IPC database yielded a list of 54 species that have the potential to occur in the Bishop Creek Project vicinity (Table 8.6-2). Two of these species, cheat grass (*Bromus tectorum*) and black locust were known to be present in the Bishop Creek Project area (Read 2015; Psomas 2020a). One species, hairy whitetop (*Lepidium appelianum*, formerly *Cardaria pubescens*) has been tentatively identified in the Bishop Creek Project area, however, its current distribution appears to be limited to the landscape area near Plant 4 (Psomas 2020a).

The 2019 and 2020 botanical field surveys included an inventory of non-native and invasive species observed within the study. A total of 57 non-native plant species were observed in the study area (Table) in 2019 and 2020. Of those, 17 are listed by Cal-IPC (Psomas 2021b; Read 2020) Table lists the Cal-IPC listed species that could potentially occur within the Bishop Creek Project area as well as the NNIP species observed (in bold print) during the 2019 and 2020 botanical surveys. The most recent (September 2019) Land Management Plan for the INF did not identify priorities or management actions for any of these species.

Table 8.6-2. NNIPS Potentially Occurring in the Project Vicinity

SCIENTIFIC NAME	COMMON NAMES	Cal-IPAC Rating
Acroptilon repens	Russian knapweed	Moderate
Agrostis gigantea	**redtop**	**–**
Agrostis stolonifera	creeping bent	Limited
***Agrostis* sp.**	**bentgrass**	***Agrostis stolonifera* is Limited**
Ailanthus altissima	tree-of-heaven	Moderate
Arundo donax	giant reed	High
Asparagus asparagoides	bridal creeper	Moderate
Avena barbata	slender oat	Moderate
Avena fatua	wild oats	Moderate
Bassia hyssopifolia	five-hook bassia	Limited
Brassica tournefortii	Sahara mustard	High
Bromus catharticus var. catharticus	**rescue grass**	**–**
Bromus diandrus	**ripgut brome**	**Moderate**
Bromus japonicus	Japanese brome	Limited
Bromus rubens	**red brome**	**High**
Bromus sp.	**brome**	**varies by species**
Bromus tectorum	**cheatgrass**	**High**
Catalpa speciosa	**showy southern catalpa**	**–**
Centaurea diffusa	diffuse knapweed	Moderate
Centaurea melitensis	tocalote	Moderate

SCIENTIFIC NAME	COMMON NAMES	Cal-IPAC Rating
Centaurea solstitialis	yellow starthistle	High
Chenopodium album	**lamb's quarters**	**–**
Cirsium arvense	Canada thistle	Moderate
Cirsium vulgare	**bull thistle**	**Moderate**
Conium maculatum	poison-hemlock	Moderate
***Cotoneaster* sp.**	**cotoneaster**	**various species are Moderate**
***Cupressus* sp.**	**cypress**	**–**
Cynodon dactylon	**Bermuda grass**	**Moderate**
Dactylis glomerata	**orchard grass**	**Limited**
Descurainia sophia	**tansy mustard**	**Limited**
Digitalis purpurea	foxglove	Limited
Dipsacus fullonum	common teasel	Moderate
Dittrichia graveolens	stinkwort	Moderate
Dysphania botrys	**Jerusalem oak**	**–**
Elaeagnus angustifolia	Russian olive	Moderate
Elymus ponticus	**tall wheat grass**	**–**
Erodium cicutarium	**redstem filaree**	**Limited**
Festuca arundinacea	**reed fescue**	**Moderate**
Festuca pratensis	**meadow fescue**	**-**
Foeniculum vulgare	fennel	Moderate
Halogeton glomeratus	Halogeton	Moderate
Helminthotheca echioides	bristly ox-tongue	Limited
Hesperocyparis glabra	**smooth western cypress**	**–**
Hirschfeldia incana	short-pod mustard	Moderate
Holcus lanatus	**common velvet grass**	**Moderate**
Hordeum murinum	**wall barley**	**Moderate**
Iris germanica	**German iris**	**–**
Lactuca serriola	**prickly lettuce**	**–**
Lathyrus latifolius	**perennial sweet pea**	**–**
Lepidium appelianum (=Cardaria pubescens)	**hairy whitetop**	**Limited**
Lepidium latifolium	perennial pepperweed	High
Malus pumila	**apple**	**–**
Malva parviflora	**cheeseweed**	**–**
Marrubium vulgare	horehound	Limited
Matricaria discoidea	**pineapple weed**	**–**
***Medicago* sp.**	**alfalfa**	**–**
Melilotus albus	**white sweetclover**	**–**
Melilotus indicus	**sourclover**	**–**
Plantago lanceolata	**English plantain**	**Limited**
Poa annua	**annual blue grass**	**–**
Poa pratensis	Kentucky bluegrass	Limited

SCIENTIFIC NAME	COMMON NAMES	Cal-IPAC Rating
***Poa* sp.**	**blue grass**	***Poa pratensis* is Limited**
Polypogon monspeliensis	rabbitsfoot grass	Limited
Populus nigra	**black poplar**	**–**
Portulaca oleracea	**purslane**	**–**
Ricinus communis	castor bean	Limited
Robinia pseudoacacia	**black locust**	**Limited**
Rubus armeniacus	**Himalayan blackberry**	**High**
***Rubus* sp.**	**blackberry**	**–**
Rumex acetosella	sheep sorrel	Moderate
Rumex crispus	**curly dock**	**Limited**
Salsola australis	**southern salsola**	**–**
Salsola paulsenii	barbwire Russian thistle	Limited
***Salsola* sp.**	**salsola**	**Limited, if *Salsola tragus***
Salsola tragus	**Russian thistle**	**Limited**
Saponaria officinalis	bouncing-bet	Limited
Schismus arabicus	Mediterranean grass	Limited
Sisymbrium altissimum	**tumble mustard**	**–**
Sisymbrium irio	London rocket	Limited
***Sonchus* sp.**	**sow thistle**	**–**
Spartium junceum	Spanish broom	High
Stipa miliacea var. miliacea	smilo grass	Limited
Tamarix aphylla	athel	Limited
Taraxacum officinale	**common dandelion**	**–**
Tribulus terrestris	**puncture vine**	**Limited**
Trifolium dubium	**little hop clover**	**–**
Trifolium repens	**white clover**	**–**
***Trifolium* sp.**	**clover**	**–**
Triticum aestivum	**wheat**	**–**
Ulmus pumila	**Siberian elm**	**–**
Verbascum thapsus	**woolly mullein**	**Limited**
Veronica anagallis–aquatica	**water speedwell**	**–**
Vinca major	**greater periwinkle**	**Moderate**
***Vitis* sp.**	**grape**	**–**

Source: Cal-IPC 2018; Psomas 2021b

Note: Invasive plant species observed in the botanical study area indicated in **bold**. Species without Cal-IPC rating are non-native plant species not considered invasive.

8.6.2 UPLAND TERRESTRIAL WILDLIFE RESOURCES

To obtain information on special status wildlife reported to occur in the Bishop Creek Project vicinity, the CDFW California Natural Diversity Database (CNDDB) (CDFW 2018b, 2020) was queried for the following USGS 7.5-minute topographic quadrangles: Coyote Flat, North Palisade, Tungsten Hills, Mount Darwin, Mount Tom, Bishop and

Mount Goddard. Additional literature reviewed includes the USFWS IPaC website (USFWS, 2018); USFWS' Seven-Year Work Plan September 2016 Version (USFWS, 2016a); the Five Year Work Plan May 2019 Version (USFWS, 2019); USFWS Unscheduled Listing Actions September 2016 version (USFWS, 2016b); List of USFS Management Indicator Species (MIS) (USDA, 2019); and a list of potentially occurring threatened and endangered and other sensitive species potentially occurring in the Wildlife Study Plan Survey Area (USFS, 2018a); the INF recently adopted a new Forest Plan requiring assessments of USFS At-Risk Species and SCC (USFS, 2020); previous biological surveys for various SCE projects (Psomas, 2004a; 2004b; 2005; 2006a; 2006b; 2007a; 2007b; 2008a; 2008b; 2010; 2014, 2019, 2021c); the Environmental Assessment (EA) prepared for the previous relicensing (FERC, 1991). Additionally, wildlife surveys were conducted throughout the Bishop Creek Project area in 2019 and 2020 (Psomas, 2021c).

Other sources in the literature review included: eBird (2019) database for observations within the Bishop Creek Project area including South Lake, Lake Sabrina, North Lake, Intake No 2, Bishop Plant 4, and Aspendell; 2014 Owens Basin southwestern willow flycatcher (*Empidonax traillii extimus*) survey results (CDFW, 2014a; Greene, 2015), yellow-billed cuckoo, and Bell's vireo surveys in Inyo and Mono counties (Greene, 2015); March-June 2018 Sierra Nevada Bighorn Sheep Location Maps (USFS, 2018b); the Butterfly Reference Document for the Inyo, Sequoia, and Sierra National Forests USFS Region 5 (USFS, 2015); and Verner (1980) for coniferous bird communities. Sources for general wildlife within the Bishop Creek Project vicinity included: FERC, 1991; Laws 2007; SCE 1986; and Schoenherr 1992. Nomenclature for scientific and common names for wildlife followed the following references, unless otherwise cited: American Fisheries Society 2013; Bradley et. al. 2014; Chesser et. al., 2018; Crother 2017; and Burgin et al. 2020a, 2020b.

As described above, numerous upland plant communities are present within the Bishop Creek Project vicinity supporting a variety of wildlife species. These plant communities mix and blend together providing a complex of habitats with an overstory of one community supporting an understory of a second community. This complexity is reflected in the wildlife species that occur in multiple communities (Psomas, 2021c).

The intermixing of the vegetation communities in the Bishop Creek Project area provides for a complex habitat allowing wildlife to utilize many different plant communities throughout a great range of elevations. The Bishop Creek Project area contains moderate to steep ridge and valley topography. Elevations within the drainage areas range from approximately 4,000-feet above msl to over 13,000-feet above msl. For this analysis the plant communities have been grouped into lower midrange and higher elevation associations:

- Lower elevation plant communities (4000-feet to 6000-feet above msl) are an interdigitated mix of canyon live oak, singleleaf pinyon pine, eastside pine, lodgepole pine, high desert mixed scrub, pine, rabbit brush, salt bush, Great Basin mixed scrub/big (basin) sagebrush, and annual grasses and forbs.

- Mid-elevation communities from 5000-feet to 7000-feet above msl consists of a mix of canyon live oak, singleleaf pinyon pine, eastside pine, lodgepole pine, limber pine, rabbit brush, Great Basin sagebrush, curlleaf mountain mahogany, and annual grasses and forbs.

Higher elevation communities above 7000-feet msl consist of a mix of canyon live oak, eastside pine, limber pine, lodgepole pine, subalpine confers and whitebark pine, bitterbrush, and Great Basin sagebrush, alpine mixed scrub, curlleaf mountain mahogany, alpine grasses and forbs, and perennial grasses and forbs.

Some representative wildlife species found within the Bishop Creek Project vicinity are listed in Table F-4, Appendix F (Volume 2). That table includes results from the general wildlife survey conducted in 2019 and 2020 (Psomas, 2021c). The field surveys included pedestrian surveys at each of the Bishop Creek Project's facilities including a 500-foot buffer around each facility to identify existing conditions, document existing wildlife, and identify potentially suitable habitat (i.e., preferred plant associations and habitat structure) for special status species including the federally-listed endangered southwestern willow flycatcher (Psomas, 2021c). Tables of additional wildlife known to exist, or observed, in the Project area can be found in Tables F-1 through F-4 in Appendix F (Volume 2).

Surveys for special status, amphibians were conducted in September 2019 prior to scheduled electrofishing in specific stream reaches. A bat habitat assessment was conducted in June 2019, a winter roost assessment was conducted in January 2020 and acoustic surveys were conducted at select Bishop Creek Project facilities in June 2020. Special status, and federal and state threatened and endangered species, are discussed in Section 8.8.3.

During the 2019 field study, a female warbling vireo (*Vireo gilvus*) was observed delivering food items to chicks in a nest within the survey area of Bishop Creek Power Plant No. 3 and Intake No. 4. This was the only active nest observed during the wildlife surveys. Several wildlife species were observed along Highway 168 that were not a part of the official survey effort at the Bishop Creek Project facilities. These species include the western toad (*Anaxyrus boreas*), California king snake (*Lampropeltis getula californiae*), Great Basin gopher snake (*Pituophis catenifer deserticola*), and the long-nosed leopard lizard (*Gambelia wislizenii*).

Other wildlife species observed at the camera stations along the above ground flow line wildlife crossings include: mule deer (*Odocoileus hemionus*), mountain lion (*Puma concolor*); grey fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*); American badger (*Taxidea taxus*), coyote (*Canis latrans*); black bear (*Urus americanus*); black-tailed jackrabbit (*Lepus californicus*); California ground squirrel (*Otospermophilus beecheyi*); white-tailed antelope squirrel (*Ammospermophilus leucurus*); chipmunk sp. (*Neotamias sp.*); green tailed towhee (*Pipilo chlorurus*); Mount Pinos sooty grouse (*Dendragapus fuliginosus howardi*); white-crowned sparrow (*Zonotrichia leucophrys*); and American crow (*Corvus brachyrhynchos*), and an unidentified toad. Tables listing all wildlife species observed in the Bishop Creek Project area are included with the FTR (Volume 3).

To date, no North American beavers (*Castor canadensis*) have been directly observed by the Relicensing Team. Based on telephone conversations between Psomas and CDFW, there is a small but persistent population of North American beavers in Bishop Creek. Currently, the beavers are located at the Tyee Trail Head. The current population of beaver in Bishop Creek are likely the result of transplanted individuals. The North American beaver is not known to be native to the eastern slopes of the Sierra Nevada in the region of Bishop Creek, although they are reported to have occurred naturally in the Truckee and Walker rivers north of the Bishop Creek Project area (Tappe 1942; Lanman et al.. 2012). Programs to transplant beaver have been undertaken by CDFW and the USFS in the past. Beaver are now found through many watersheds in the state (Lundquist and Dolman, 2016).

8.6.2.1 Game Species

Game species are animals hunted for sport or pleasure. Information on game species potentially present in the Bishop Creek Project vicinity is provided in this section because of their commercial and recreational value. Game species are regulated by CDFW (2014b) and are defined under the California Fish and Game Code. Resident and migratory game birds are defined in California Fish and Game Code §3500; game mammals are defined in §3950(a); and mountain lions are included in §3950 but are explicitly excluded as a game mammal in §3950.1.

Section 3950 of the California Fish and Game Code defines game mammals as: “deer (genus *Odocoileus*), elk (genus *Cervus*), prong-horned antelope (genus *Antilocapra*), wild pigs (*Sus domesticus*), including feral pigs and European wild boars (genus *Sus*), black and brown or cinnamon bears (genus *Euarctos*), mountain lions, jackrabbits and varying hares (genus *Lepus*), cottontails, brush rabbits, pigmy rabbits (genus *Sylvilagus*), and tree squirrels (genus *Sciurus* and *Tamiasciurus*).” Part (b) adds Nelson “bighorn sheep (subspecies *Ovis canadensis nelsoni*) are game mammals only for the purposes of sport hunting described in subdivision (b) of Section 4902.”

Section 3700.1 of the California Fish and Game code states “(a) It is unlawful for any person, except a person licensed pursuant to paragraph (2) of subdivision (a) of Section 3031, to take any migratory game bird, except jacksnipe, coots, gallinules, western mourning doves, white-winged doves, and band-tailed pigeons, without first procuring a state duck hunting validation as provided in subdivision (b) and having that validation in his or her possession while taking those birds.”

Section 3683 of the California Fish and Game Code establishes the upland game birds as follows: “Upland game bird species include both of the following:

(a) All of the following resident game birds:

(1) Doves of the genus *Streptopelia*, including, but not limited to, spotted doves, ringed turtledoves, and Eurasian collared doves
(2) California quail and varieties thereof
(3) Gambel’s or desert quail

(4) Mountain quail and varieties thereof
(5) Sooty or blue grouse
(6) Ruffed grouse
(7) Sage hens or sage grouse
(8) White-tailed ptarmigan
(9) Hungarian partridges
(10) Red-legged partridges including the chukar and other varieties
(11) Ring-necked pheasants and varieties thereof
(12) Wild turkeys

(b) All of the following migratory game birds:

(1) Jacksnipe
(2) Western mourning doves
(3) White-winged doves
(4) Band-tailed pigeons

Game species occurring within the vicinity of the Bishop Creek Project are included, but not limited to Table 8.6-3.

Table 8.6-3. Game Species Occurring within the Bishop Creek Project Vicinity

Game Birds	Game Mammals
Mallard (*Anas platyrhynchos*)	**Mule Deer** (*Odocoileus hemionus*)
Blue Grouse (*Dendragapus obscurus*)	Elk (*Cervus canadensis*)
Ruffed Grouse (*Bonasa umbellus*)	Wild Pig (*Sus domesticus*)
Wild Turkey (*Meleagris gallopavo*)	**Black-tailed Jackrabbit** (*Lepus californicus*.)
Mountain Quail (*Oreortyx pictus*)	Desert cottontail (*Sylvilagus audubonii*)
California Quail (*Callipepla californica*)	**Douglas' squirrel** (*Tamiasciurus douglasii*)
Wilson's Snipe (Gallinago delicata)	**Black Bear** (*Urus americanus*)
Band-tailed Pigeon (*Patagioenas fasciata*)	
Mourning Dove (*Zenaida macroura*)	

Source: CDFW 2014b; 2018b

Note: Species observed during the 2019 general wildlife survey are indicated in **bold**.

8.6.3 Potential Adverse Effects and Issues regarding Botanical Resources

No changes in vicinity of the Project operations are proposed as part of the Proposed Action, therefore no adverse environmental effects to upland botanical resources are anticipated. While the barriers (dams) that are part of the vicinity of the Project tend to alter natural patterns of sediment and wood transportation downstream, this could be addressed through systematic planned releases of these materials with due consideration of impacts on water quality and aquatic life, while avoiding impacts to the Project operations or storage capacity.

8.6.3.1 Effects of Continued Project Operations and Maintenance on Distribution of Invasive Plants in the Project Area

SCE and stakeholders identified the need for an Assessment of Invasive Plants (TERR 2) to determine the type, distribution and potential of invasive plants observed at the Bishop Creek Project site. Results from 2019 and 2020 field surveys, including those conducted in recreation sites, as well as data collected during the riparian monitoring program conducted as a 4(e) condition of the existing license, reported a total of 17 invasive plant species in the Bishop Creek Project area. There are no data available to indicate whether the number or abundance of invasive plant species has increased or decreased over time as a result of Bishop Creek Project operations, with the exception of black locust. This species was not found upstream of Power Plant No. 4, but it was observed at a monitored site downstream of Power Plant No. 4 after minimum instream flow releases began and perennialized a reach that would have only ephemeral flow in a dry or normal year

In general, SCE has not identified a pervasive spread of invasive species as a result of Project facilities and operations; existing measures around ground disturbing activities are effective. However, based on results of the study analyzed in this Exhibit E and included in Volume 3, SCE has identified the persistence and gradual downstream movement of black locust as a likely effect of the Project.

8.6.4 Potential Adverse Effects and Issues Regarding Wildlife Resources

Based on the completed studies and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action.

8.6.4.1 Effects of Continued Operation and Maintenances on Upland Wildlife Habitat and associated Wildlife

Upland habitat in the Bishop Creek Project area is widespread and occurs on hillsides and even as understory to other plant communities. In terms of potential effects, upland habitat is largely found along the edges of SCE's access roads to its facilities, and at the lower elevation facilities (Power Plants No. 5 and No. 6) it is the dominant plant community. Some upland habitats mix as understory to riparian and coniferous forest habitats. Maintenance of Bishop Creek Project facilities occurs on SCE property, which is already disturbed or within previously disturbed and maintained areas, such as the areas surrounding valve houses and gaging stations. Road maintenance primarily consists of clearing and grading as needed. Grading maintains current roads, and road widening does not occur during routine O&M.

Based on the analysis discussed in this Exhibit E and the results of the Wildlife Study (TERR 4, Volume 3) and because the Proposed Action does not anticipate operational changes beyond those for PME measures, SCE identified no potential impacts of continued O&M on upland wildlife habitat and associated wildlife.

8.6.4.2 Effects of Continued Operation and Maintenance of the Project Transmission lines on Migratory Birds and Raptors

Most of the transmission lines were removed from the Bishop Creek Project FERC Boundary during the last relicensing. However, some transmission lines remain part of the Bishop Creek Project, including:

- A 3.7-mile-long, 115-kilovolt (kV) transmission line from Power Plant No. 3 to the Control Substation; (Control-Power Plant No. 3-Power Plant No. 4)
- A 0.7-mile-long, 115-kV transmission line which runs from the Power Plant No. 4 switchyard to the transmission line connecting Power Plant No. 3 to the Control Substation: and (Control-Power Plant No. 3-Power Plant No. 4)
- A 150-foot-long, 55-kV transmission line which runs from the Power Plant No. 5 to tap the transmission line between Power Plant No. 6 switchyard and the Control Substation (Control-Mount Tom).

Based on the Wildlife Study performed for the relicensing of the Bishop Creek Project and a review of proposed Bishop Creek Project operations, no adverse effects to migratory birds or raptors due to the presence of power transmission lines in the Bishop Creek Project area have been identified. No deaths of migratory birds or raptors have been reported in the Bishop Creek Project boundary due to powerline encounters. Additionally, raptor use of transmission facilities has been determined to be minimal because these transmission lines are not on a major raptor flyway or in a key feeding area (SCE 2019b).

8.6.4.3 Consistency with Inyo National Forest Land Management Plan

Chapter 2 of the 2019 Management Plan (USDA, 2019) describes forest-wide conditions and management direction for botanical and wildlife resources. This direction applies across all lands of the Inyo, including desired conditions, objectives, goals, standards, guidelines, and potential management approaches. Using the results obtained from TERR 2 and TERR 4, SCE assessed botanical resources, wildlife resources and their habitat, against the desired future conditions stated in Chapter 2.

Desired conditions for wildlife and botanical resources, including invasive species are outlined below.

- SPEC-FW-DC 01: Sustainable populations of native and desirable nonnative, plant and animal species are supported by healthy ecosystems, essential ecological processes, and land stewardship activities, and reflect the diversity, quantity, quality, and capability of natural habitats on the Inyo National Forest. These ecosystems are also resilient to uncharacteristic fire, climate change, and other stressors, and this resilience supports the long-term sustainability of plant and animal communities.
- SPEC-FW-DC 05: The Inyo National Forest provides high quality hunting and fishing opportunities. Habitat for nonnative fish and game species is managed in locations

and ways that do not pose substantial risk to native species, while still contributing to economies of local communities.

- TERR-FW-DC 05: Each vegetation type contains a mosaic of vegetation conditions, densities and structures. This mosaic, which occurs at a variety of scales across landscapes and watersheds, reflects conditions that provide for ecosystem integrity and ecosystem diversity given the inherent capabilities of the landscape that is shaped by site conditions and disturbance regimes.

- INV-FW-DC 01: Terrestrial and aquatic invasive species are controlled or eradicated when possible, and establishment of new populations is prevented.

- INV-FW-DC 02: The area affected by invasive species and introduction of new invasive species is minimized.

The Bishop Creek Project is managed in a way consistent with these desired conditions and no changes are currently proposed to Bishop Creek Project O&M activities. For all invasive plants observed as part of this study, the extent to which Bishop Creek Project operations may contribute to the establishment and spread of these species, as compared to recreational activities and anglers, is not clear. To support efforts to control invasive species in the Bishop Creek Project Area, copies of geographic information system (GIS) data, photographs, populations, and sizes of invasive and special status plant species were submitted to the INF botanist in early 2021.

8.6.4.4 Proposed Mitigation and Enhancement Measures

SCE proposes to maintain current operations at the Bishop Creek Project. No new facilities are proposed. For this reason, SCE is proposing to modify existing measures as necessary to address updated INF Land Management objectives and project specific information that was developed in the completed studies. PME measures described in Appendix A (Volume 2):

- PME-5: Wildlife Resources Management Plan
- PME-6: Botanical Resources Management Plan
- PME-7: Invasive Species Management Plan

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8.7 WETLANDS, RIPARIAN, AND LITTORAL RESOURCES

This section describes the wetland, riparian, and littoral habitats, as well as those species that occupy them, that have the potential to occur in the Bishop Creek Project area. The discussion presented here is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform our understanding of Bishop Creek Project effects.

For the purpose of mapping wetland, riparian, and littoral resources, the Bishop Creek Project area is defined as the FERC Project boundary plus a 200-foot buffer around Bishop Creek Project facilities. For the purpose of focused surveys for invasive, RTE species the study area includes the Bishop Creek Project area defined above in addition to riparian monitoring sites. This includes monitoring sites on Bishop Creek between Power Plants No. 4 and No. 5; two sites on Bishop Creek between Power Plants No. 2 and No. 3; a Birch Creek site downstream of the diversion; and two sites on McGee Creek, one above and one below the diversion dam (Figure 8.7-1).

A Bishop Creek Riparian Community Study (TERR 1) was conducted in 2019 – 2020 as part of the relicensing process in response to stakeholder requests. The two objectives of the TERR 1 study were to: conduct an analysis of existing data using the guild approach; and to analyze existing data pertaining to black cottonwood (*P. balsamifera ssp. trichocarpa*).

8.7.1 WILDLIFE SPECIES INCLUDING INVASIVE SPECIES IN RIPARIAN HABITATS

The floodplain, wetland, and riparian wildlife resources described below are based on direct observations from past biological studies in the Bishop Creek Project vicinity (Psomas 2004a, 2004b, 2005, 2006a, 2006b, 2007a, 2007b, 2008a, 2008b, 2010, 2014, Read 2020). In addition, the following two FERC resources were reviewed: EA: Bishop Creek Project, and the Order Issuing New License for the Bishop Creek Project (FERC 1991, 1994). The CNDDB (CDFW 2018, 2022) was queried for special status wildlife species for the following USGS 7.5-minute topographic quadrangles: Coyote Flat, North Palisade, Tungsten Hills, Mt. Darwin, Mount Tom, Bishop, and Mt. Goddard. The USFWS IPaC (USFWS 2021) website was also utilized, and the results for RTE species are discussed in Section 8.8 – Rare, Threatened, Endangered, and Special Species Affected Environment.

Floodplain, wetland, riparian, and littoral habitats occur throughout the Bishop Creek Project vicinity bordering the creeks, lakes, and impoundments within the Project area. These habitats interrelate with the surrounding upland plant communities described in Section 8.6.1 Upland Botanical Resources, by providing important feeding, breeding, and nesting areas for many species. Wetland and riparian habitats also provide important habitat for many amphibian species dependent upon moisture and water. Wildlife species which are known to occur or are anticipated to occur in these habitats are listed in Table 8.7-1.

Table 8.7-1. Wildlife Species Known to Occur in Floodplain, Wetland, Riparian, and Littoral Habitats Throughout Bishop Creek Project Vicinity

Common Name	Scientific Name
American kestrel	*Falco sparverius*
American robin	*Turdus migratorius*
belted kingfisher	*Megaceryle alcyon*
Dipper	*Cinclus mexicanus*
Mt. Lyell salamander	*Hydromantes platycephalus*
mountain bluebird	*Sialia currucoides*
mule deer	*Odocoileus hemionus*
northern pocket gopher	*Thomomys talpoides*
red-tailed hawk	*Buteo jamaicensis*
Sierra treefrog	*Pseudacris sierra*
western terrestrial garter snakes	*Thamnophis elegans*
white-crowned sparrow	*Zonotrichia leucophrys*
Wilson's warbler	*Wilsonia pusilla*
yellow-rumped warbler	*Dendroica coronota*

Source: SCE 2019

8.7.2 Wetland and Riparian Plants: Native and Invasive Species

Wetland and riparian vegetation discussed in this section are based on keys and descriptions from the USFS using the Calveg classification system preferred by the INF. The description of alliances within a 200-foot buffer around Bishop Creek Project facilities, creeks, and lakes are referenced in Section 8.7.4, Riparian Zone Guild Analysis. There are two dominant floodplains, wetlands, riparian, and littoral community types present in the Bishop Creek Project area: quaking aspen (*Populus tremuloides*) (14.4 percent) and perennial lake or pond (11.5 percent). Table 8.7-2 provides a list of floodplain, wetland, and riparian plant communities determined to be within the 200-foot buffer around Bishop Creek Project facilities referenced, while maps can be found in Appendix G (Volume 2). In total these communities occupy approximately 28 percent of the Bishop Creek Project area.

Table 8.7-2. Summary of Floodplain, Wetland, Riparian and Littoral Plant Community Types

Map Label and Name	Total Acres	Percent of Mapped Area
HJ - Wet Meadows	14.68	0.44%
NR - Riparian Mixed Hardwood	29.48	0.87%
QO - Willow	8.24	0.24%
QQ - Quaking Aspen	484.69	14.36%
W2 - Perennial Lake or Pond	389.17	11.53%
WA - Water (General)	1.68	0.05%
WL - Willow (Shrub)	24.35	0.72%
Subtotal, Floodplains, Wetlands, Riparian	*952.29*	*28.21%*

Source: USDA 2019

8.7.2.1 Riparian Mixed Hardwood

No native hardwood species or genus is dominant within the riparian mixed hardwood alliance, but it includes a mixture of two or more non-dominant hardwoods including mountain dogwood (*Cornus nuttallii*), Fremont cottonwood (*Populus fremontii*), and/or black cottonwood (*P. balsamifera ssp. trichocarpa*). Tree willows (*Salix* spp.), quaking aspen and water birch (*Betula occidentalis*) are also prevalent. This community is usually found in shaded drainages, riparian, and seep sites, within elevations that range from below 1,000-feet above msl to approximately 9,600-feet msl (SCE 2019).

8.7.2.2 Quaking Aspen

With a canopy cover of at least 50 percent, quaking aspen forms clonal stands and dominates other hardwoods in this alliance. It generally occurs above an elevation of approximately 4,600-feet msl in association with moist soil and freshwater seeps. At higher elevations and under exposed conditions, quaking aspen stands may maintain a shrub-like form and never reach tree size (SCE 2019).

8.7.2.3 Water, Including Perennial Lakes, and Ponds

Water is labeled in Calveg mapping where permanent sources of surface water are identified within a landscape unit of sufficient size to be mapped. Within the Bishop Creek Project area, the category includes lakes, streams, and intakes. These areas generally have minimal vegetation cover except for the edges of the wet meadows (SCE 2019).

8.7.2.4 Wet Meadows

The wet meadows community is partially composed of sedges (*Carex* spp.), rushes (*Juncus* spp.) and spikerushes (*Eleocharis* spp.) with a combined cover of at least 50 percent. Presence of this community indicates year-long water availability, as in lakeshore, stream bank, perched water tables, and seep areas. Perennial forbs such as monkeyflower (*Mimulus primuloides*) and corn lily (*Veratrum californicum*), as well as woody species such as shrub willows, mountain alder (*Alnus incana* ssp. *tenuifolia*) and lodgepole pine are commonly associated with this montane alliance (SCE 2019). In 2019, three special status plant species were observed to be associated with mesic habitat within the Bishop Creek Project area: small-flowered grass of Parnassus (*Parnassia parviflora*), Frog's-bit buttercup and marsh arrow-grass (*Triglochin palustris*). These species are discussed further in Section 8.8 (Rare, Threatened, Endangered and Special Status Species).

8.7.2.5 Willow (Tree)

Tree willows of any species have a canopy cover of at least 50 percent. This community occurs where stream or pond conditions provide sufficient moisture at low to moderate elevations, mostly between 2,600-feet msl to 7,400-feet msl. Riparian hardwoods such as water birch and Fremont cottonwood often occur in proximity to this community (SCE 2019).

8.7.2.6 Willow (Shrub)

Shrub willow cover is at least 50 percent, and these communities occupy low to high elevation streams, springs, and seeps within a broad elevation range of 3,000-feet msl to 12,000-feet msl. Depending on location and elevation, species may include Geyer's willow (*S. geyeriana*), gray-leaved Sierra willow (*S. orestera*), Lemmon's willow (*S. lemmonii*), narrow-leaved willow (*S. exigua*), shining willow (*S. lucida*), and/or yellow willow (*S. lutea*). As this community may occupy the wettest upland sites, the Wet Meadows Alliance is frequently associated with it, as are other riparian shrubs such as California blackberry (*Rubus ursinus*) (SCE 2019).

8.7.3 Black Cottonwood

8.7.3.1 Life History and Reproduction

A summary of the life history of black cottonwood was summarized by Steinberg (2001) and Sawyer et al. (2009). It is a deciduous tree that can live for 200 years or more. Successful reproduction is most often asexual (clonal), through root suckers and sprouts. Sexual reproduction through seed dispersal often occurs when stream or river flows begin to decline in spring and moist mineral soil is exposed. However, while seed production can be prolific, seed viability lasts only a few weeks and successful seedling establishment is episodic. Seedling establishment depends on a coincidence of events wherein there is sufficient soil moisture during the first month of growth. Seedling mortality can be high if root growth is slower than recession of the water table or stream. With seed germination and seedling survival episodic and dependent on timing and moisture conditions, clonal growth and expansion (vegetative regeneration) is the most commonly observed life history trait of the willow family (Salicaceae) to which black cottonwoods belong. However, sexual reproduction (seedling recruitment) remains important for genetic diversity of the black cottonwood population and for replacing older trees that are approaching their age limit, which is believed to be on the order of 200 years or more (Sawyer et al. 2009).

Regular scour may benefit seedling recruitment of black cottonwoods, but adversely affect other native vegetation, especially wetland or riparian herbs and mosses that also favor streamside growth. The existing monitoring program under the current license takes an ecosystem-level approach by measuring a wide variety of metrics rather than a focus only on individual species such as black cottonwood.

The only diseases causing widespread mortality for black cottonwood is transmitted by an invasive insect native to Southeast Asia (polyphagous shothole borer [*Euwallacea nr. fornicatus*]). However, this insect has not been reported to occur in Inyo County and its distribution appears limited to southern California counties at this time (CalInvasives, n.d.).

8.7.3.2 Monitoring and Study Results

Riparian monitoring studies conducted at 5-year intervals as a condition of the existing license did not detect whether or not yearly scouring (to provide conditions for seed germination and success) occurred. The field methods of those studies did include searches for seedlings present on each site, and that data showed observations of black cottonwood seedlings in some years and not others. Flows in 2019 were particularly high due to weather conditions the previous winter, which flooded many of the sample plots located next to the stream and may have provided sufficient scour (exposed moist soil) to favor seedling establishment. Seedlings will be searched for during the next monitoring season, currently scheduled for 2024.

During the study scoping process, SCE and stakeholders identified the potential need for a focused analysis of abundance data for black cottonwood. Stakeholders discussed data reported from the 2014 field season (Read 2015) indicating that black cottonwood cover at the riparian monitoring sites (Figure 8.7-1) may be in decline; there was an interest in understanding potential causes and whether data collected in 2019 would show a continuation of this trend. Results from the 2019 monitoring data, compared to previous years, found that changes in abundance of black cottonwood over time varied by reach on Bishop Creek. As presented in more detail below, along a perennial reach upstream of Power Plant No. 3, abundance of black cottonwood increased at one site but decreased at an adjacent site with no barrier or dam between the sites. Under the minimum instream flow release program, abundance of black cottonwood increased along a reach upstream of Power Plant No. 5 that had normally been dry in summer prior to the releases.

Ages for the black cottonwoods that were included in this study are not known, although a previous study in 1994 collected tree cores showing one tree to be 146 years old, but most are much younger and dating back to the 1930-1940 time period (Figure 8.7-1).

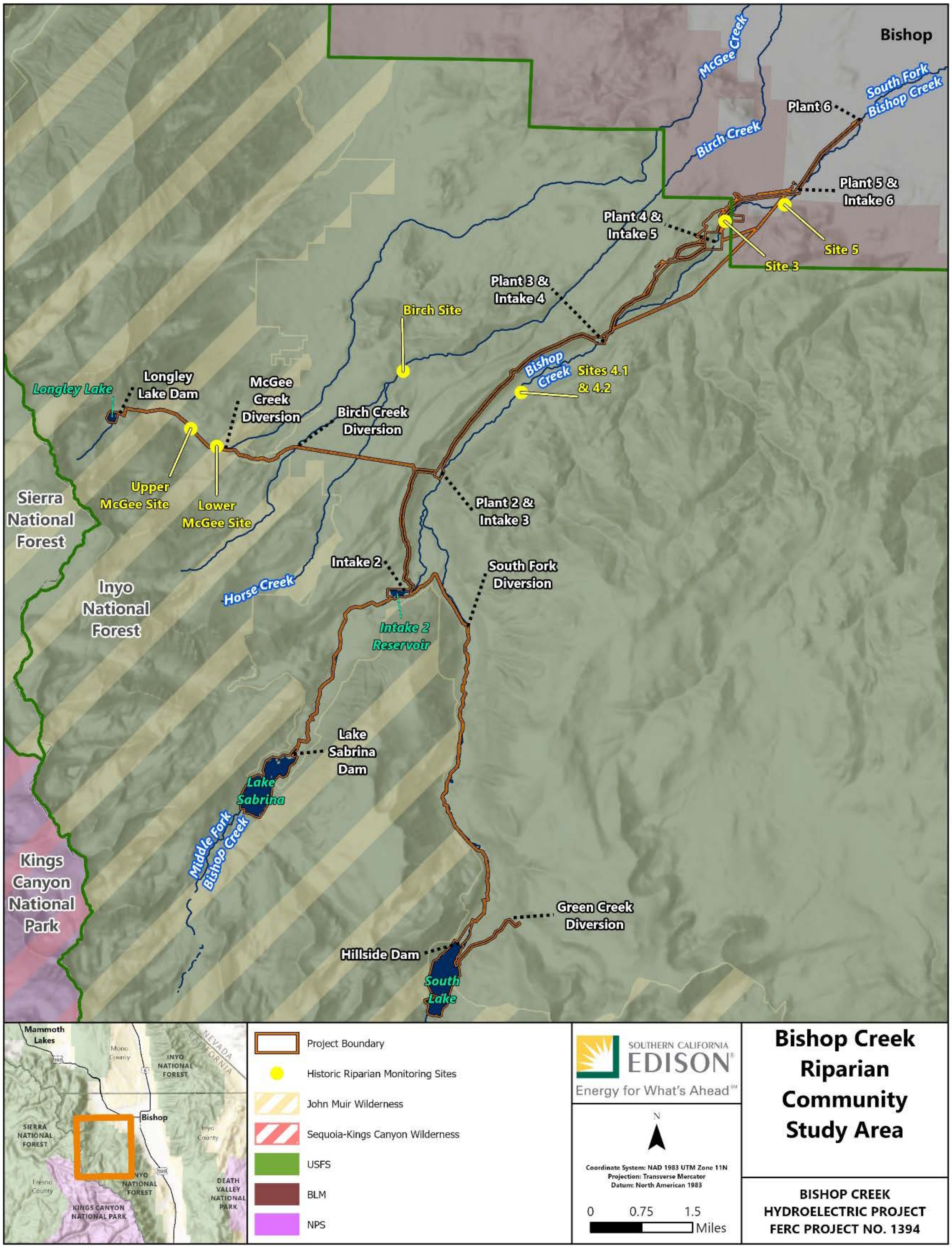

Figure 8.7-1. Riparian Community Study Area.

For this study, SCE defined black cottonwood cover in terms of trends, rather than significance; Table Table 8.7-3 illustrates abundance data for black cottonwood between 1991 and 2019. Counting number of trees is not an accurate metric of abundance in the case of clonal species such as black cottonwoods, where in the field two trees may be distinguished in 1 year but counted as 1 tree 5 years later. SCE utilized an abundance metric as percent canopy cover to provide meaningful comparisons of sites and years without the "noise" that would be introduced by variability in tree counts of a clonal species from year to year.

Table 8.7-3. Percent Cover of Black Cottonwood, 1991 through 2019

Bishop Creek Site	1991[1]	1992[1]	1993[1]	1999[2]	2004[2]	2009[2]	2014[2]	2019[2]
Site 4.1	7.5	6.0	5.7	9.1	8.2	7.7	5.8	11.2
Site 4.2	12.6	11.9	13.2	15.2	12.3	10.7	7.3	2.2
Site 5	0.3			1.2	1.3	1.7	0.5	1.4

Source: Kleinschmidt 2022
1 Baseline before instream flows
2 Post baseline

Abundance data for black cottonwoods shown in Table 8.7-3 are shown graphically in Figure 8.7-2 through Figure 8.7-4. Data reported from the 2014 field season showed a decline in black cottonwood cover in riparian areas compared to baseline data from 1991 to 1993 (Read 2015, 2020a). But 5 years later, in 2019, along a perennial reach upstream of Power Plant No. 3, abundance of black cottonwood increased at one site (Site 4.1) but decreased at an adjacent site (Site 4.2) with no barrier or dam between the two sites (Kleinschmidt 2022). Under the minimum instream flow release program, abundance of black cottonwood increased along a reach upstream of Power Plant No. 5 (Site 5) that had normally been dry in summer prior to the releases. Black cottonwoods were not observed at any monitored sites on Birch and McGee creeks in 2019 or previous years.

In general, monitoring results indicated that the minimum flow releases were associated with significant growth of riparian vegetation in stream reaches that were historically dry in summer (Kleinschmidt 2022). Stream reaches which had perennial flow before the releases were implemented have not exhibited any detectable changes in the riparian vegetation directly attributable to Bishop Creek Project operations or variation in flow. Observations from 2019 revealed that higher stream flows do not necessarily affect all riparian species in the same way – for example, mesoriparian meadow herbs are less resilient to flooding than hydroriparian shrubs and trees.

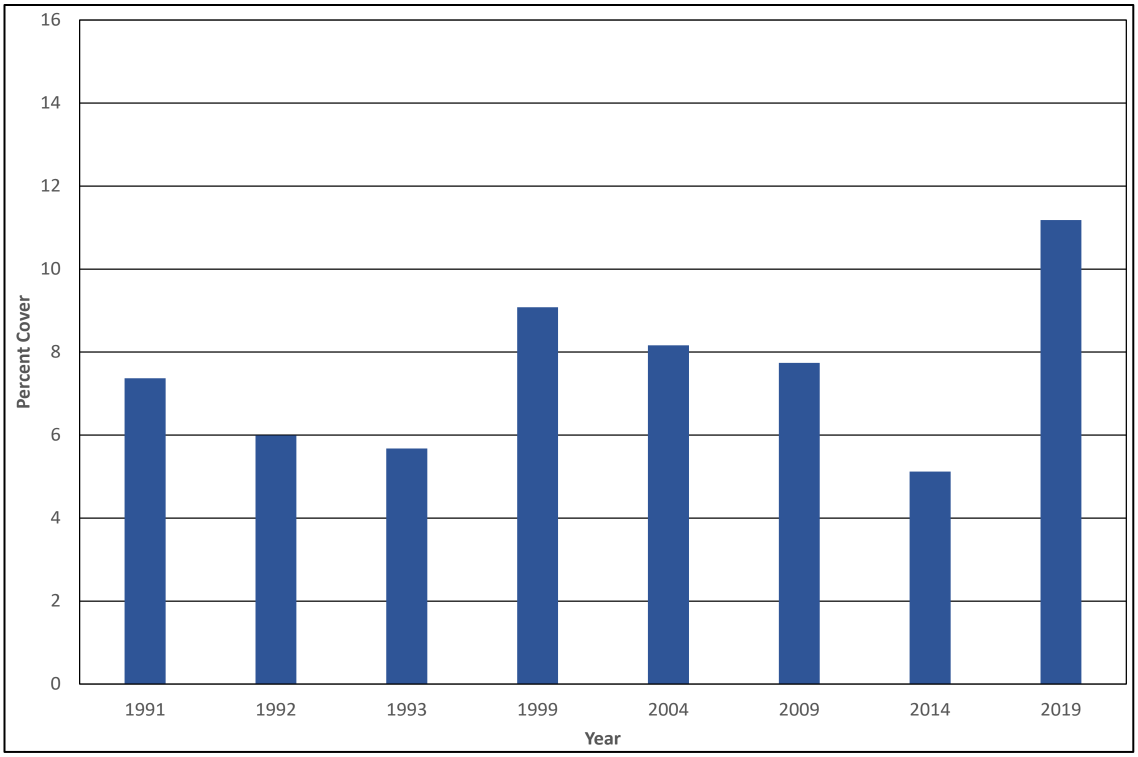

Figure 8.7-2. Percent Cover of Black Cottonwood at Bishop Creek Site 4.1.

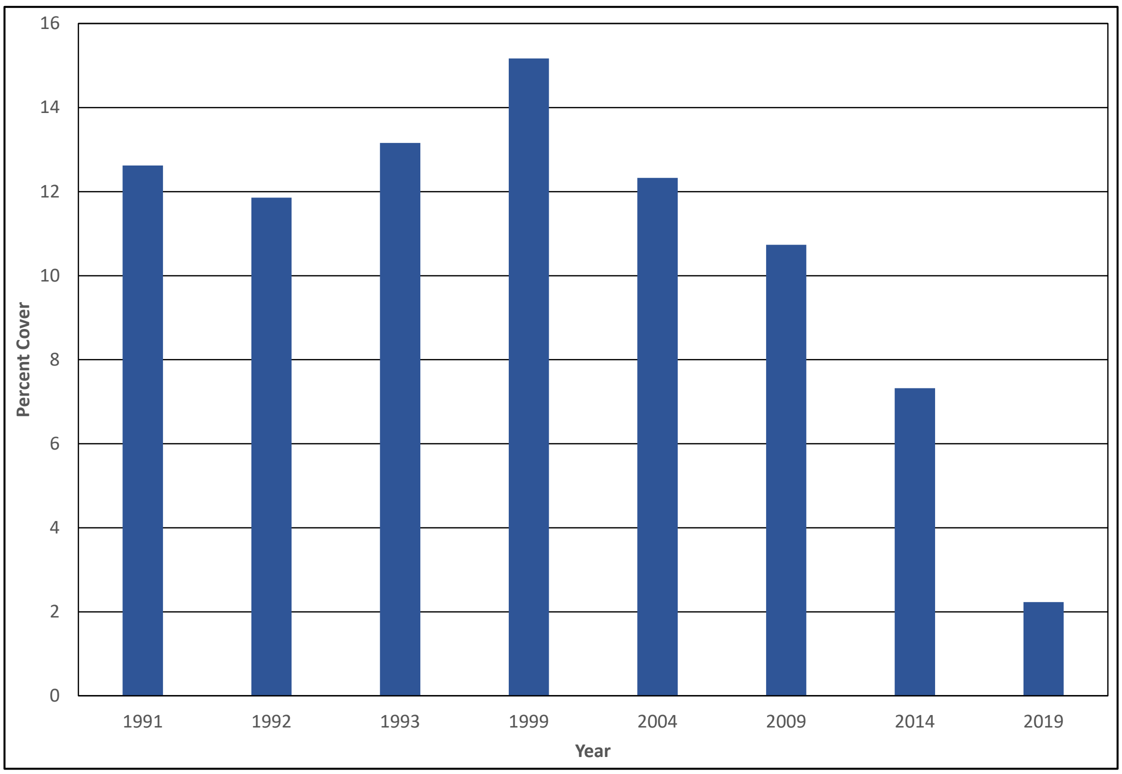

Figure 8.7-3. Percent Cover of Black Cottonwood at Bishop Creek Site 4.2.

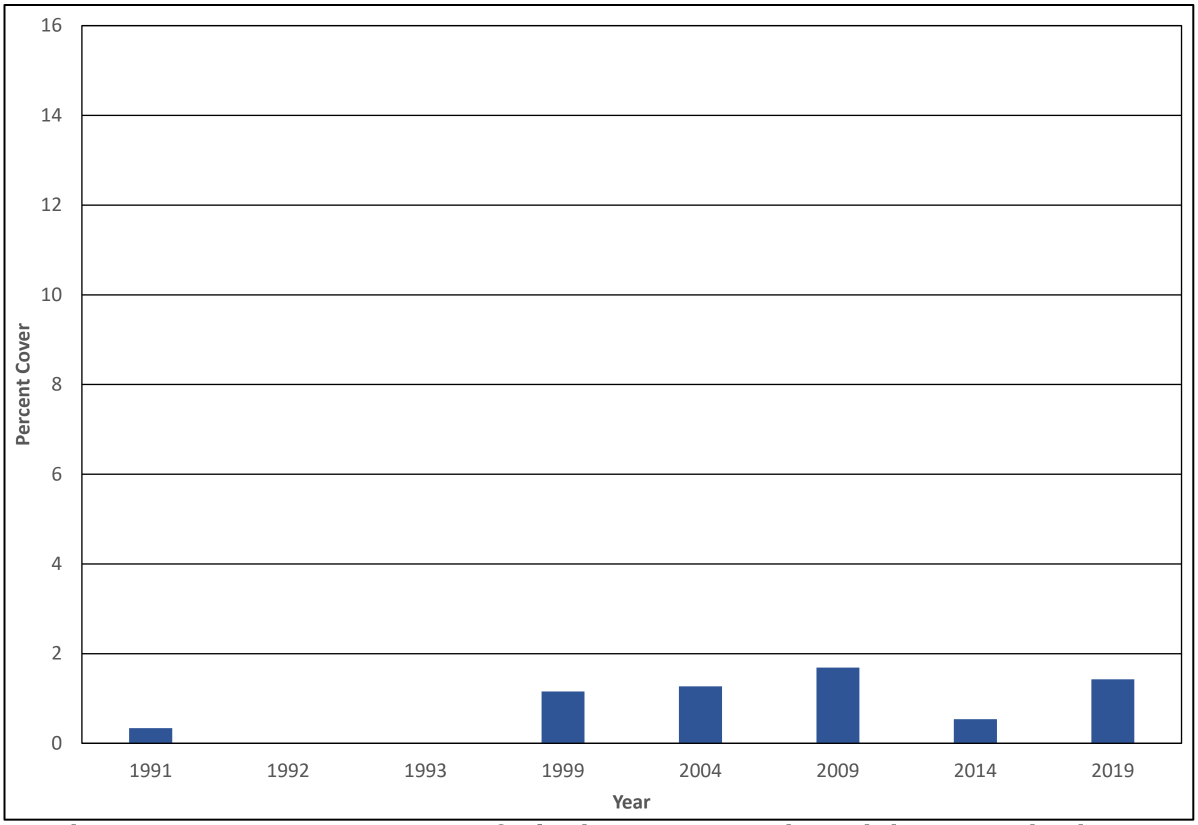

Figure 8.7-4. Percent Cover of Black Cottonwood at Bishop Creek Site 5.

8.7.4 Riparian Zone Guild Analysis

Native plant species that occupy the riparian zone have a range of life histories that can be grouped into "guilds", using an approach described by Lytle et al. (2017). In many cases these life histories are well documented making the guild approach a useful tool for analyzing data in an ecological context instead of species by species. The guild classifications provide more insight into changes in diversity over time, as compared to lumping taxa into simple riparian versus upland categories.

Monitoring data collected from 1991 through 2019 in compliance with Federal Power Act (FPA) Section 4(e) conditions of the existing license were re-analyzed in 2020 using the guild approach of Lytle et al. (2017) to assess the condition of the riparian community. In this guild approach, species that share similar "vital rates" (fecundity, mortality, self-thinning) are analyzed as a group rather than as individual species. Table 8.7-4 describes the guilds used in this analysis. The guild analysis was conducted in response to a request from the INF as a desktop exercise to reevaluate existing data using the newer guild approach. This analysis did not replace the more detailed analysis presented in an earlier riparian monitoring report submitted to FERC's compliance docket in 2019. For Birch and McGee creeks, the guild analysis was used as part of the riparian study, not for the analysis of black cottonwood abundance.

Table 8.7-4. Description of Guild Classifications

Guild	Description
Hydroriparian Shrub	Active-floodplain specialist that has a high resilience to flooding. Recruits aggressively following floods, but prone to mortality in drought years. Examples from Bishop Creek: sandbar willow (*Salix exigua*), Geyer's willow (*S. geyeriana*), yellow willow. Note that water birch are included in the hydroriparian shrub guild. While this species could also be botanically classified as a tree, field data show that its distribution in the Bishop Creek Project area is limited to areas along stream banks immediately adjacent to flowing streams, and therefore fits the life history description of this guild.
Hydroriparian Tree	Long-lived, flood-adapted species that depend on freshly scoured bare substrates for recruitment. Examples from Bishop Creek: black cottonwood, Fremont cottonwood, aspen.
Mesoriparian Meadow	The original definition included only perennial grasses and forbs that recruit during flood years, with mature plants moderately tolerant of flooding and drought. The authors of the study used Canada horseweed (*Conyza canadensis*) as an example in this category, but in California this species is an annual, not a perennial. Therefore, native annual and perennial grasses and forbs were included in this category. Additionally, for the purpose of the license-required monitoring program it was determined by the INF that the most objective method of assessing riparian classification was to use the National List of Plant Species that Occur in Wetlands as a starting point. This list has been updated several times since monitoring began, the most recent update being Lichvar et al. (2016). Two categories of the Lichvar et al. (2016) list were used in analyzing the 2019 and previous data: the list for western valleys, mountains, and coast; and the list for the arid west. Annual and perennial grasses and forbs with a rank of Facultative Wetland or Obligate Wetland were assigned to the Mesoriparian Meadow guild. Herbs were added to this guild which are ranked as facultative, but field observation has indicated the species are primarily associated with riparian zones and seeps (e.g., Indian hemp, *Apocynum cannabinum*).
Upland Shrub	This category is a modification of the "desert shrub" category defined by Lytle et al. (2017) as "upland, drought-tolerant shrubs which continue to recruit and grow during drought years but suffer high mortality from floods." This was modified based on the range of shrubs such as big sagebrush extends from the desert into most of the Bishop Creek Project area and co-occurs with other communities such coniferous forest.
Mesic Meadow	This guild includes shrubs and herbaceous species with a wetland rank of Facultative, Facultative Wetland, and Obligate that have been observed in the INF to be associated with mesic conditions within, but also outside of, the riparian zone, such as snowmelt depressions and seeps.
Upland Herbs and Upland Trees	These guilds were included as it was determined that the Upland Shrub guild alone excluded too many taxa that also benefit from years of above-normal precipitation and (in the case of trees) higher groundwater tables and accretion flows. Two examples are Jeffrey pine and ponderosa pine, which have been observed to be largely restricted to stream floodplains and canyons in the Project area. If, for example, abundance of hydroriparian shrubs or trees changes over time, but abundance of upland guilds also changes in parallel, it is possible that these changes are attributable to environmental factors that are outside of the control of the Project.

Source: Read 2020b

Six permanent sampling locations were established in 1990, prior to the start of the baseline period and have been monitored at 5-year intervals through 2019 (Figure 8.7-1). The sample locations were divided into two groups: locations that were historically dry in the summer prior to 1994 flow releases (Bishop Creek Sites 3 and 5, Lower McGee Creek), and locations that were historically had perennial flow (Bishop Creek Sites 4.1 and 4.2, Upper McGee Creek).

Each location included a transect 5-meters-wide and long enough to monitor the changes or expansion of the riparian vegetation zone. Tree, shrub, and herbaceous cover were estimated along the transects. Only living plants rooted within transects were included in the cover calculations. Dead and dying trees and shrubs were not included in the cover calculations but were included in mortality counts.

Results of the guild analysis are included in the TERR 1 Final Technical Report (Volume 3). These results were consistent with previous analyses using a species-by-species approach, insofar as perennialization of a stream reach below Power Plant No. 4 and of Birch and McGee creeks, below the diversions, increased abundance of riparian vegetation after minimum instream flows began in 1994. The analysis confirmed that exceptionally high flows in 2019 flooded areas occupied by mesoriparian meadow (herbaceous) vegetation, resulted in a decline in cover by this guild that had not been observed in previous years (Read 2020b).

Abundance of mesoriparian meadow herbs and hydroriparian shrubs increased the most at all three sample sites after 1994 when steam reaches were perennialized. Mesoriparian meadow herbs represented 5 to 9 percent of cover in 2014 (Read 2020b). However, in 2019 flows were abnormally high, submerging the stream edge where this guild was usually observed, thus no herbs were observed (Read 2020b). Hydroriparian shrubs, consisting of shrubby willows and water birch, increased in abundance with the addition of minimum instream flows, with cover ranging from 8 to 19 percent (Read 2020b). The woody roots of this guild made them more resilient to flooding and scour compared to the herbs, thus no decline in abundance was observed in 2019 (Read 2020b).

Mesic meadow guild plants were only found in two historically perennial sites, Site 4.2, and Upper McGee with cover values below 5 percent (Read 2020b). Like the mesoriparian meadow herb guild, abundance declined significantly in 2019 with scouring flows. Abundance of hydroriparian trees was like the baseline years, except for Site 4.2, where abundance of black cottonwood declined in 2019. Upland shrub and tree cover increased at this site (Read 2020b).

8.7.5 Potential Adverse Effects and Issues

No changes in Bishop Creek Project operations are proposed as part of the Proposed Action, therefore no adverse environmental effects to wetlands, riparian and littoral habitat are anticipated. No riparian or wetland dependent wildlife, or waterfowl or the ecosystems that support such wildlife in the Bishop Creek Project area would be adversely affected from the continued operation of the Project as proposed by SCE.

The following sections address potential effects as identified by the TSP and SD1 (Table 8.1-1). Based on the completed studies, and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action.

8.7.5.1 Potential Impacts of Continued Bishop Creek Project Operation and Maintenance on the Riparian Community as a Whole

Monitoring conducted under the existing license, both prior to and after implementation of the minimum instream flow release program that began in 1994, has shown that flow in reaches that were typically summer-dry has resulted in significant growth of riparian vegetation with associated stabilization of the stream banks.

Results of the Riparian Community Assessment Study (TERR 1) assessed black cottonwood abundance to determine whether the decline observed in 2014 (baseline) is within a natural range of variability or could be related to Bishop Creek Project operations. The study showed that riparian vegetation in the reach of Bishop Creek between Power Plants No. 4 and No. 5, as well as the reach of McGee Creek below the diversion benefited from the minimum instream flow release program that was implemented in 1994 under the existing license. This is evidenced by the significant growth of riparian vegetation and with associated stabilization of the stream banks.

While results of the study indicate that the observed declines of black cottonwood in specific locations is not related to Project effects, the barriers (dams) that are part of the Bishop Creek Project tend to alter natural patterns of sediment and wood routing and could potentially favor some methods of recruitment over others. As discussed in Section 8.7.5.3, alignment with desired conditions of the INF that relate to the riparian community functions could be achieved through systematic planned releases with due consideration of impacts on water quality and aquatic life, while avoiding impacts to Bishop Creek Project operations or storage capacity.

8.7.5.2 Potential Impacts of Continued Project Operations on Riparian and Wetland Habitat and Associated Wildlife, including Waterfowl and Wetland-dependent Birds

With no changes in Bishop Creek Project operations and water management, the Project reservoirs (South Lake, Lake Sabrina, and Longley Lake), along with the intake impoundments (e.g., Weir Lake, Intake No. 2, Intake No. 3) will remain and continue to provide open water habitat for waterfowl, and continued support of riparian/wetland edge habitat for numerous wildlife species. Minor changes are being proposed to the FERC

Project boundary, but those changes are administrative in nature and not anticipated to effect waterfowl or riparian or wetland associated wildlife.

As a result of the Wildlife Study (TERR 4) performed for the relicensing of the Bishop Creek Project, no current or historic records of nesting southwestern willow flycatcher were found within or near the Project area, no nesting habitat was found in the wildlife study area and no southwestern willow flycatchers were observed (or heard) during the wildlife studies. Therefore, this riparian bird species will likely not be affected by the continued operation of the Bishop Creek Project.

No effects to riparian habitat as a result of continued operation of the Bishop Creek Project are anticipated. In fact, the continued operation of the Bishop Creek Project is anticipated to contribute to the maintenance and potential expansion of the riparian community below Power Plant No. 4 because of instream flow releases resulting from the previous license.

No Yosemite toad (*Corynorhinus townsendii*), northern leopard frog *Lithobates pipiens*), or SNYLF were observed during the surveys. In addition, there are no historic or current recorded occurrences of Yosemite toad along Bishop Creek. Although there are historic records for northern leopard frog and SNYLF in the Bishop Creek Project area, these species are considered extirpated from the Project area. Therefore, there would be no Project effects to these species.

Riparian monitoring conducted as a requirement of the existing license has shown increases in riparian and wetland vegetation cover and diversity after the minimum instream flow program was implemented in 1994. These increases were significant between Power Plant No. 4 and No. 5 and downstream of the McGee Creek diversion, all of which had an ephemeral hydrologic regime prior to implementation of the flow release program. No changes in Bishop Creek Project operations are proposed under the new license, therefore it is expected that continued minimum flows will result in further expansion and increased diversity of riparian and wetland habitat in these reaches.

8.7.5.3 Consistency with Inyo National Forest Land Management Plan

Chapter 2 of the Land Management Plan (Management Plan) for the INF (USDA, 2019) discusses forest-wide desired conditions and management direction. The chapter contains direction that applies forest-wide (across all lands of the Inyo), unless more stringent or restrictive direction is found following forest-wide direction. Forest-wide direction includes desired conditions, objectives, goals, standards, guidelines, and potential management approaches. SCE assessed the riparian community against the desired future conditions of Chapter 2, specifically those watershed conditions (WTR) and Rivers and Streams conditions (RCA-RIV), which include riparian conservation areas and the riparian and aquatic environments contained within them, such as rivers, streams, meadows, springs, and seeps.

SCE has reviewed these desired conditions against data and observations from TERR 1 and the ongoing riparian monitoring effort as part of current license Article 405 to determine if the relicensing of the Bishop Creek Project would have an impact on the land manager's ability to achieve the desired condition. Relevant desired conditions include Watersheds Desired Conditions 01[20] and 06[21], and the Rivers and Streams Desired Conditions 03[22] and 04[23]. As discussed in the FTR for the TERR 1 study (Volume 3 of this DLA), monitoring data collected both before and after the instream flow program was implemented in 1994 indicate that health of riparian communities in the watershed is consistent with Watershed Desired Condition 01 and Rivers and Streams Desired Conditions 03 and 04. Due to the presence of barriers (dams) as part of the Bishop Creek Project, it is assumed that the sediment regimes below the dams are not within a natural (pre-Project range), as stated in Watershed Desired Condition 06. However, SCE proposes to develop a sediment management plan (PME 3, Appendix A) that will provide some additional flushing flows; the intent of which would be to help achieve the desired condition in specific reaches where there may be a concern.

8.7.5.4 Proposed Mitigation and Enhancement Measures

Under the new license, the Bishop Creek Project would continue with its current existing O&M activities, as described in the Proposed Action. No new construction is proposed therefore, SCE would continue to implement the minimum instream flows as required under the existing license (PME 1, Appendix A).

Under the new license, SCE would continue to implement the existing plans; adding to or adapting as appropriate to be consistent with updated land management objectives. PME-5 and PME-6 are a Wildlife Management Plan and Botanical Resources Management, respectively, and are described further in Appendix A. PME-3 (Sediment Management Plan) will provide an approach to reintroducing sediment back into Bishop Creek via flushing flows.

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[20] Watershed Desired Condition WTR-FW-DC-01 states that "adequate quantity and timing of water flows support ecological structure and functions, including aquatic species diversity and riparian vegetation. Watersheds are resilient to changes in air temperatures, snowpack, timing of runoff, and other effects of climate change.

[21] Watershed Desired Condition WTR-FW-DC-06 states that "the sediment regime within waterbodies is within the natural range of variation. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

[22] Rivers and Streams Desired Condition RCA-RIV-DC-03 states "instream flows are sufficient to sustain desired conditions of riparian, aquatic, wetland, and meadow habitats and retain patterns of sediment, nutrients, and wood routing as close as possible to those with which aquatic and riparian biota evolved. The physical structure and condition of streambanks and shorelines minimize erosion and sustain desired habitat diversity"

[23] Rivers and Streams Desired Condition RCA-RIV-DC-04 states "Streams and rivers maintain seasonal water flow over time, including periodic flooding, which promotes natural movement of water, sediment, nutrients, and woody debris. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning, large wood structures, and sites for riparian vegetation to germinate and establish."

8.7.6 References

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8.8 RARE, THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES AFFECTED ENVIRONMENT

This section describes species considered RTE as well as those species that are considered special status that have the potential to occur in the Bishop Creek Project area. For purposes of this analysis the term “Special Status” is intended to capture multiple designations that may have meaning for resource managers; where appropriate, the agency specific terms will be identified as described in Section 8.8.2 - Definitions below. The discussion is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action and how the completed studies inform the understanding of the Bishop Creek Project effects. For the purposes of this study, the Bishop Creek Project area is defined as the FERC Project boundary. The study area consists of locations subject to regular O&M activities, including power plants, dams, diversions, valve houses, and access roads, including a 500-foot survey area buffer around each facility. The area also encompasses recreation facilities directly associated with the Bishop Creek Project. In total, these constitute a subset of the Bishop Creek Project area as a whole.

8.8.1 OVERVIEW

A review of existing literature was conducted to determine the potential for RTE plant and wildlife species and special-status species to occur in the Bishop Creek Project vicinity and further analyzed to determine the potential for each of those species to occur in the Bishop Creek Project area. Note that the distinction of rare only applies to plants, not wildlife. This review included previous biological reports prepared for SCE (Psomas 2004a, 2004b, 2005, 2006a, 2006b, 2007a, 2007b, 2008a, 2008b, 2010 and 2014) and the environmental assessment conducted for the Bishop Creek Project (FERC, 1991). Field surveys for RTE plants were conducted around SCE facilities and selected recreation areas in 2019 and 2020, respectively. CNDDB (CDFW 2018a, 2020) and the California Native Plant Society Inventory of Rare, Threatened and Endangered Plants (CNPS 2018) were queried for RTE plant and wildlife species for the following USGS 7.5-minute topographic quadrangles: Coyote Flat, North Palisade, Tungsten Hills, Mt. Darwin, Mount Tom, Bishop and Mt. Goddard. Based on the literature review and database search, it was determined that no RTE plants listed by either the USFWS or CDFW were found within the Bishop Creek Project area. Three non-RTE plant species listed by other entities were observed during the field surveys:

- Frog’s bit buttercup is listed by the INF as a Species of SCC and by the CNPS as RTE in California but this species is more common in other areas. This species is a perennial herb associated with mesic habitat and was observed on Bishop Creek in 2019 in the area of Intake No. 3.

- Small-flowered parnassia is listed by the CNPS as RTE in California but more common in other areas. This species is a perennial herb associated with rocky seeps and was observed in 2019 in the area of the Birch Creek diversion.

- Marsh arrow-grass is listed by the CNPS as RTE in California but more common in other areas. This species is a perennial herb associated with mesic habitat and was observed in 2019 in the area of the Birch Creek diversion.

Regarding RTE wildlife, additional sources of literature reviewed include: eBird 2019 database for observations within the Bishop Creek Project vicinity including South Lake, Lake Sabrina, North Lake, Intake No. 2, Bishop Power Plant No. 4 and Aspendell; Sierra High Mountain Lakes Project Monitoring Units; SNYLF and mountain yellow-legged frog (MYLF) (northern distinct population segment [DPS]) field season 2017 (CDFW, 2018b); 2014 Owens Basin southwestern willow flycatcher survey results (CDFW, 2014); 2015 USFWS Report on willow flycatcher; yellow-billed cuckoo, and Bell's vireo surveys in Inyo and Mono counties (Greene, 2015); USFWS Information for Planning and Consultation (IPaC) website (USFWS, 2021); USFWS Seven-Year Work Plan September 2016 Version (USFWS, 2016a) and USFWS Unscheduled Listing Actions September 2016 version (USFWS, 2016b); Sierra Nevada Yellow-legged Frog Critical Habitat Final Rule (USFWS, 2016c); Sierra Nevada Bighorn Sheep Critical Habitat Final Rule (USFWS, 2008); List of USFS MIS (USFS, 2018a); list of USFS at-risk species and species of conservation concern (USFS 2020)24; a list of threatened and endangered and other sensitive species potentially occurring in the Bishop Creek Project area (USFS 2018b); and March-June 2018 Sierra Nevada Bighorn Sheep Location Maps (personal communication between USFS and Psomas e-mail dated October 10, 2018).

8.8.2 Definitions

For the purposes of this section, the following terms are defined below as follows.

A **federally endangered species** is one facing extinction throughout all or a significant portion of its geographic range. A **federally threatened species** is one likely to become endangered within the foreseeable future throughout all or a significant portion of its range (USFWS 2021). The presence of any federally listed threatened or endangered species in a project impact area generally imposes severe constraints on projects, particularly if projects should result in "take" of the species or its habitat. The term take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct. Harm in this sense can include any disturbance of species' habitats during any portion of its life history (USFWS 2021).

Proposed species or **candidate species** are those officially proposed by the USFWS for addition to the federal threatened and endangered species list. Because proposed species may soon be listed as threatened or endangered, these species could become listed prior to or during implementation of a project.

[24] Note that the list of USFS at-risk species and species of conservation concern replace and supersede the USFS MIS list.

At-Risk species are federally recognized threatened, endangered, proposed, and candidate species and species of conservation concern within a plan or forest area (USDA, 2019).

8.8.2.1 Special Status

A **special-status species** is defined as a species considered by one or more branches of the federal government (e.g., USDA, USFS or BLM) or by the state of California to merit regulatory consideration in association with prosecution of a Project (SCE, 2019). Special status species are those species that do not have legal protection under either the federal or state ESA. Endangered means a species is in danger of extinction throughout all or a significant portion of its range. Threatened means a species is likely to become endangered within the foreseeable future. Special status consists of all the other species that are in decline and may be in danger of extinction but not legally protected under either the federal or state ESAs.

SCC is a rank assigned by the INF. The California Rare Plant Rank (CRPR), formerly known as the California Native Plant Society (CNPS) List, is a ranking system by the Rare Plant Status Review group and managed by the CNPS and the CDFW (CDFW, 2021). Special status wildlife species are those species that are considered SSC by the state of California, categorized as SCC by the USFS and the USFWS.

8.8.2.2 California State Status

The state of California considers an endangered species to be one whose prospects of survival and reproduction are in immediate jeopardy, a threatened species as one present in such small numbers throughout its range that it is likely to become an endangered species in the near future in the absence of special protection or management, and a rare species as one present in such small numbers throughout its range that it may become endangered if its present environment worsens (CDFW, 2018a). Rare species status applies only to California native plants. State-listed threatened and endangered wildlife species are protected against take unless an Incidental Take Permit (ITP) is obtained from the resource agencies.

The state of California created the **Fully Protected** classification to identify and provide additional protection to those animals that are rare or that face possible extinction. Lists were created for fish, amphibians and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under the state and/or federal ESAs; however, some have not been formally listed.

Various sections of the California Fish and Game Code provide lists of fully protected reptile and amphibian (§ 5050), bird (§ 3511), and mammal (§ 4700) species that may not be taken or possessed at any time, except as provided in Sections 2081.7, 2081.9, or 2835. The CDFW is unable to authorize the issuance of permits or licenses to take these species, except for necessary scientific research.

8.8.3 Federal and State Listed Wildlife Species in the Project Area

As a result of the literature review, and further analysis, it was determined that three wildlife species designated as threatened or endangered by the USFWS or CDFW and two California Fully Protected Species are known to occur within the Bishop Creek Project area, and four other wildlife species designated as threatened or endangered by the USFWS or CDFW were determined to potentially occur within the Bishop Creek Project area. Five wildlife species designated as threatened or endangered by the USFWS or CDFW were determined unlikely to occur in the Bishop Creek Project area (Table F-3, Appendix F; Volume 2).

8.8.4 Special-Status Species

8.8.4.1 Plants

A review of the existing literature was conducted to determine the potential for special status plant species to occur in the Bishop Creek Project vicinity which is defined to include the USGS 7.5-minute topographic quadrangles: Coyote Flat, North Palisade, Tungsten Hills, Mount Darwin, Mount Tom, Bishop, and Mount Goddard. To obtain information on known special status plant species reported to occur in the Bishop Creek Project vicinity, the CDFW, CNDDB (CDFW, 2018b) and the CNPS Inventory of RTE (CNPS 2018) were queried for occurrences of special status plant species in the above-mentioned quadrangles. In addition, this review included biological reports prepared for individual studies within the Special Status Plants Survey Area, including the 2019 survey (Psomas 2004a, 2004b, 2005, 2006a, 2006b, 2007a, 2007b, 2008a, 2008b, 2010, 2014, 2020a and 2021a) and the environmental analysis for the Bishop Creek Project (FERC 1991).

Based on the literature review, a total of 47 special status plant species were reported to occur within the Bishop Creek Project vicinity. These species were further analyzed to determine their likely occurrence in the Bishop Creek Project area. This information is summarized in the FTR (Volume 3) and is categorized as follows:

- **Known to occur in the Project Area**: Special-status plants with recorded populations in the Project area, as determined by CNDDB or SCE studies;

- **May potentially occur in the Project Area**: Special-status plants that may potentially occur in the Project area based on the geographic location and elevation of the Project and vegetation alliances and other habitat features present; and

- **Unlikely to occur in the Project Area**: Special-status plants that are unlikely to occur because their range does not overlap the Project area; or for which the Project area does not support appropriate habitat.

Table F-1 of Appendix F (Volume 2) also summarizes pertinent information for each species, including status, blooming period, and preferred habitat, with information on the location of occurrences within the Bishop Creek Project area, if applicable. Five special status plant species were observed in the botanical study area during the 2019 and 2020 botanical surveys: few-flowered eriastrum (*Eriastrum sparsiflorum*), stiff lomatium (*Lomatium rigidum*), small-flowered grass-of-Parnassus, frog's-bit buttercup, and marsh arrow-grass (Psomas 2020a, 2021a). Additionally, Inyo beardtongue (*Penstemon papillatus*) was observed downstream of the McGee Creek Diversion Dam during the 2019 license required riparian monitoring (Read 2020). Table 8.8-1 lists the locations of the six special status plant species observed during the 2019 and 2020 botanical surveys, a map of those observations is located in Appendix H (Volume 2).

Table 8.8-1. Special Status Plant Species Occurrence and Frequency in 2019

Project Facilities	Species (Number of Individuals Observed)					
	Few-flowered Eriastrum	Stiff Lomatium	Small-flowered grass-of-Parnassus	Marsh Arrow-grass	Frog's-bit Buttercup*	Inyo Beardtongue
South Lake (Hillside) Dam						
Sabrina Lake Dam						
McGee Creek Diversion		300				
Birch Creek Diversion			10	5		
Green Creek Diversion						
Bishop Creek South Fork Diversion Dam	150	1				
Bishop Creek Intake No. 2 Dam	10	50				
Bishop Creek Powerhouse No. 2 and Intake No.3	100	100				
Bishop Creek Powerhouse No. 3 and Intake No.4	1,000	2			<10	
Bishop Creek Powerhouse No. 4 and Intake No.5	100					
Bishop Creek Powerhouse No. 5 and Intake No.6	1,000					
Bishop Creek Power Plant No. 6	1,000					
Incidental Observations						
Bishop Creek between Powerhouses 4 and 5	infrequent, less than 1% cover					
McGee Creek below diversion dam						infrequent, less than 1% cover

Source: Psomas, 2020a

*Frog's-bit buttercup was not positively identified as having special status at the time of field collection. Field survey results include partial data.

8.8.4.2 Wildlife

Based on the literature review, a total of six special wildlife species were reported to occur within the Bishop Creek Project vicinity. These species were further analyzed to determine their likely occurrence in the Bishop Creek Project area. Special status wildlife species on the list were then categorized as follows:

- Known to occur in the Bishop Creek Project vicinity: wildlife species with recorded occurrences in the Project vicinity, as determined by CNDDB or SCE studies;
- May potentially occur in the Bishop Creek Project vicinity: wildlife species that may potentially occur in the Project vicinity based on the geographic location and elevation of the Project and wildlife habitats present.

One special status species, the northern goshawk (*Accipiter gentilis*), was reported as occurring within the study area, and another five sensitive wildlife species were determined to have the potential to occur within the study area (Table 8.8-2). Northern goshawks were observed within the Birch Creek diversion survey area within quaking aspen and eastside pine habitat. Audio and visual observations were made of adult and juvenile goshawks. Additionally, three inactive nests were found with the aspen woodland. Active nesting success was confirmed at the one known northern goshawk Protected Activity Center (PAC) within the Bishop Creek Project area. In 2019, the Buttermilk PAC was confirmed active.

In 2019, the northern goshawk protocol survey could not be conducted due to the timing of approvals; however, biologists did observe goshawks on Birch Creek, and confirmed that they are in the Bishop Creek Project area and are breeding there. Goshawk surveys must be conducted very early in the season; the biologists were unable to obtain the needed approvals early enough. Nonetheless, observing goshawks in the Bishop Creek Project area satisfies the intent of the survey.

Table F-2 in Appendix F (Volume 2) summarizes pertinent information for each bird SCC, including status, preferred habitat, likelihood of occurrence, if applicable, and if it was observed during field surveys. Fourteen bird species designated as SCC by the USFWS are expected to occur within the study area, and another four SCC bird species are not expected to occur for breeding but may occur as a migrant within the study area. Of the listed SCC bird species, five were observed in 2019 (FTR, Volume 3).

A Brewer’s sparrow (*Spizella breweri*), a USFWS Bird SCC, was observed at the Bishop Creek South Fork Diversion Dam and Bishop Creek Intake No.2 Dam survey areas flying through quaking aspen habitat in both areas.

A rufous hummingbird (*Selasphorus rufus*), a USFWS Bird SCC, was observed at the South Lake and Green Creek diversion survey areas, flying through lodgepole pine and subalpine conifer habitat respectively.

A green-tailed towhee, a USFWS Bird SCC, was observed at the Sabrina Lake Dam, McGee Creek Diversion, Birch Creek Diversion, Green Creek diversion, Bishop Creek South Fork Diversion Dam, and Bishop Creek Intake No.2 Dam survey areas. Green-tailed towhees were observed in the following habitats: quaking aspen, curlleaf mountain mahogany, and subalpine conifer.

A Cassin's finch (*Haemorhous cassinii*), a USFWS Bird SCC, was observed at the South Lake and Lake Sabrina survey areas, flying through lodgepole pine and quaking aspen habitat.

A Williamson's sapsucker (*Sphyrapicus thyroideus*), a USFWS Bird SCC, was observed at the Lake Sabrina and Birch Creek Diversion survey areas, flying through quaking aspen and Eastside pine habitat respectively.

The USFWS IPaC (USFWS 2021) provided a list of bird SCC, as listed in Table F-2; Appendix F (Volume 2). That table also identifies the breeding period, preferred habitat, potential to occur and any pertinent observations of the birds found in the Bishop Creek Project area.

Table 8.8-2. Special Status Wildlife Species Occurrence

Note: Species observed during 2019 general wildlife survey indicated in **bold**.

Scientific/ Common Name	Federal Status	State Status	Habitat	Likelihood for Occurrence/Occurrence Notes	2019/ 2020 Survey
Known to Occur In the Project Vicinity					
Accipiter gentilis northern goshawk	BLM_S USFS _SC	CDF_S, CDFW_S SC	Usually nests on north slopes, near water. Red fir, lodgepole pine, Jeffrey pine, and aspens are typical nest trees within north coast coniferous forest, subalpine coniferous forest, and upper montane coniferous forest habitats from 915 ft. to 9900 ft.	Known to occur. This species has been recorded 0.18 miles north of Birch-McGee Diversion, near Birch Creek; and 0.75 miles south of South Lake Dam on the east side of South Lake.	Observed
May Potentially Occur In the Project Vicinity					
Corynorhinus townsendii Townsend's big-eared bat	USFS _SSC BLM_S	CDFW_S SC	Roosts in the open, hanging from walls and ceilings throughout California in a wide variety of habitats, including chaparral, chenopod scrub, Great Basin grassland, Great Basin scrub, upper and lower montane coniferous forest, meadow and seep riparian forest/woodland, and valley and foothill grassland. Most common in mesic sites. Roosting sites limiting. Extremely sensitive to human disturbance. Found in elevations from 4000 ft. to 10,800 ft.	May potentially occur. This species has been recorded at Yaney Mine, approximately 1.1. miles east of the Project watershed’s eastern boundary, 1.6 miles northeast of Power Plant No. 5 and Intake No. 6.	Not observed
Euderma maculatum spotted bat	BLM_S	CDFW_S SC	Feeds over water and along washes; almost entirely on moths. Needs rock crevices in cliffs or caves for roosting within wide variety of habitats from arid deserts and grasslands through mixed conifer forests from elevations mostly 900 ft. to 2700 ft. but up to 9700 ft.	May potentially occur. This species has been recorded 1.5 miles northeast of Power Plant No. 6, located in a residential area between Highway 395 and Highway 168, northeast of the Project watershed northeastern-most boundary.	Not observed
Lepus townsendii western white-tailed jackrabbit	–	CDFW_S SC	Open areas with scattered shrubs and exposed flat-topped hills with open stands of trees, brush and herbaceous understory within sagebrush, subalpine conifer, juniper, alpine dwarf shrub and perennial grassland habitats, in elevations from 120 ft. to 12,000ft.	May potentially occur. This species has been recorded north of Bishop, northeast of the Project watershed’s northeastern-most boundary, 4.5 miles northeast of Power Plant No. 6 along North Fork Bishop Creek near Highway 6.	Not observed

Scientific/ Common Name	Federal Status	State Status	Habitat	Likelihood for Occurrence/Occurrence Notes	2019/ 2020 Survey
Lithobates pipiens northern leopard frog	–	CDFW_SSC	Highly aquatic species. Shoreline cover, submerged, and emergent aquatic vegetation are important habitat characteristics within freshwater marsh, Great Basin flowing waters, Great Basin standing waters, marsh and swamp, wetland habitats, from sea level to 7000 ft.	May potentially occur. This species has been recorded northwest of the Project watershed's northernmost boundary, 1.7 miles northwest of Power Plant No. 6, 0.4 mile east of Birch Creek, 4 miles west of Bishop.	Not observed Species analyzed in Aquatic Resource Section
Martes caurina sierrae Sierra marten	USFS_SSC	–	Needs variety of different-aged stands, particularly old-growth conifers and snags which provide cavities for dens/nests, within mixed evergreen forests with more than 40% crown closure along Sierra Nevada and Cascade mountains, from elevation 8000 ft. to 10,300 ft.	May potentially occur. This species has been recorded 2.7 miles southwest of Lake Sabrina Dam, along Middle Fork Bishop Creek just south of Dingleberry Lake.	Not observed
USFS; BLM; CDFW; CDF **LEGEND:** **USFWS:** S: Sensitive			**USFS** SSC Species of Conservation Concern **BLM** S Sensitive	**CDFW** SSC Species of Special Concern WL Watch List	

Source: CDFW 2018b; Psomas 2020c

Bats

On June 10, 2019, a bat habitat assessment was conducted to determine potential for significant bat roosts at Bishop Creek Project facilities along Bishop Creek (Psomas 2020b). Significant roosts consist of potential maternity roosts or winter hibernacula. A survey for wintering bats was performed on January 27, 2020. The purpose of the winter bat survey was to determine if Bishop Creek Project facilities, especially power plants and associated outbuildings are used by bats as winter hibernacula. In June 2020 an acoustic survey was performed at facilities found to have evidence of roosting bats to determine which species are utilizing the facilities.

Summer Roosting

The power plants were determined to be the most suitable for bat day roosting. Evidence of day roosting bats were observed in Power Plant Nos. 2, 3, 5, and 6 in 2019. In June 2020 ultrasonic acoustic surveys were conducted at these facilities to determine which species are utilizing the facilities. Appurtenant structures, such as sheds and warehouses, were also inspected; however, no evidence of day-roosting was observed, and the other structures did not provide environmental conditions equivalent to the power plants (e.g., accessibility, thermal insulation, heat sources).

The flushing events that occur intermittently in the tailraces are likely to deter any roosting. Regardless, the tailraces at Power Plants No. 6, No. 5, and No. 2 are substantially taller and wider than the others and have some limited potential to support bat roosting. The underground extent of those tailraces is not accessible for a daytime visual survey.

Potential maternity roosts occur at Power Plants No. 5 and No. 6. To support maternity roosts, a facility should include a heat source and insulation. No maternity roosting is anticipated at Bishop Creek Project facilities without power plants, including the facilities on Birch Creek and McGee Creek.

Ten bat species were acoustically recorded at the Bishop Creek Project facilities: California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), little brown myotis (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanensis*), hoary bat (*Aorestes cinereus*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), canyon bat (*Parastrellus hesperus*), and Mexican free-tailed bat (*Tadarida brasiliensis*). Table 8.8-3 details which species were recorded at each Bishop Creek Project facility.

Table 8.8-3. Results of the June 2020 Acoustic Bat Survey

Project Facility	Species Recorded*									
	California myotis	western small-footed myotis	little brown myotis	long-legged myotis	Yuma myotis	hoary bat	big brown bat	silver-haired bat	canyon bat	Mexican free-tailed bat
Powerhouse 6	O	X	–	–	X	X	X	X	X	X
Powerhouse 5	–	–	–	–	X	–	O	–	–	X
Powerhouse 3	X	X	–	X	X	–	X	X	X	–
Powerhouse 2	–	X	X	X	X	X	X	X	X	X

* Bat species confidently identified as being recorded during the surveys are marked by “X”. Species that could not be confidently identified but may have been recorded (i.e., poor-quality recordings or no diagnostic features recorded) are marked by “O”. Species that were not recorded at a survey location are marked by “–”.

Source: Psomas 2020b

No special status bat species were recorded during the acoustic surveys. Although previously recorded in the greater vicinity (Pierson and Rainey 1998; Anderson 2018), calls associated with spotted bat or Townsend’s big-eared bat(*Corynorhinus townsendii*) were not recorded during this survey. Spotted bat calls are distinctive because of their lower frequency and no calls resembling them were recorded. Townsend’s big-eared bat is much more difficult to detect acoustically given the low intensity of the calls they are known to emit. Regardless, no calls likely emitted from a Townsend’s big-eared bat were recorded. This survey adds nine bat species known from Bishop Canyon to the 2018 INF NaBat Stationary Detector Sites Report (Long and Weller 2018), which recorded little brown myotis and long-eared myotis (*Myotis evotis*) in Bishop Canyon near Aspendell.

WINTER ROOSTING

A survey for wintering bats and potential winter roosting sites at Bishop Creek Project facilities was conducted on January 27, 2020. The purpose of the winter bat survey was to determine if Bishop Creek Project facilities, especially power plants and associated outbuildings are used by bats as winter hibernacula. No sign of winter roosting was observed in any power plant or associated structure. Evidence, such as guano, was found in Power Plant No. 2, No. 5, and the transformer building. The guano was not fresh and was likely from summer or late fall use. Another possibility is occasional use during periods when bats are active during winter (i.e., warm temperatures when bats might become active for short periods (Psomas, 2020b).

Power Plants No. 4 and No. 6 were not considered to have potential winter activity, at least as hibernacula, because of the lack of any secluded and cold roosting locations. Power Plant No. 3, while containing no current evidence of bat use, did have a few locations that might serve as at least temporary roosts for torpid bats (i.e., upper ceiling/rafter corners).

AMPHIBIANS

In September 2019, diurnal and nocturnal surveys were conducted to determine the presence or absence of special status amphibian species, including the federally-threatened Yosemite toad, federally-endangered SNYLF, and the northern leopard frog a California SSC, in potentially suitable aquatic and adjacent upland habitat in survey areas along Bishop Creek near Bishop Creek Project facilities (Psomas, 2019).

No Yosemite toad, northern leopard frog, or SNYLF were observed during the surveys, nor were any other amphibian species detected. Overnight temperatures during the surveys were mild with the lowest temperature recorded at 37 F. The timing of amphibian surveys may have coincided with the onset of overwintering of some amphibians.

Although suitable terrestrial habitat for the Yosemite toad, northern leopard frog, or SNYLF was present throughout the Bishop Creek Project area, suitable breeding habitat was limited to outside of the Project’s operations area. Despite the presence of suitable habitat for the three special status amphibian species, they are not expected to occur within the surveyed areas or within the Bishop Creek Project’s operations area due to an abundance of predatory fish species, such as trout, throughout Bishop Creek (Knapp 1996, Knapp and Matthews 2000). Additionally, Northern leopard frog was last recorded in Birch Creek area in 1960 in the vicinity of the Rocking K Ranch (CDFW, 2018b). All other reported localities occur down in the Owens Valley. Yosemite toad has never been recorded within the Bishop Creek Watershed (CDFW 2018c; 2020)

The USFWS has indicated that populations of these species are extant only in high elevation lakes in the Sierra Nevada Mountains (USFWS 2016c), and surveys conducted by the CDFW (2018c) for these special status amphibians did not include Bishop Creek. CDFW’s monitoring of populations of these special status amphibians suggest that all known extant populations occur above the Bishop Creek Project area in the high elevation's lakes above the Wonder Lakes chain.

8.8.4.3 At-Risk Species

Appendix F (Volume 2) presents the list of the USFS's at-risk species for the INF. The tables provide the status, habitat and range, and other information provided by the USFS.

Of the 34 species listed in Table F-3 of Appendix F, 11 are listed under either the federal or state ESA. The remaining 23 species are considered species of conservation concern by the USFS. Of those, the Mt. Pinos sooty grouse and mule deer were the only two species observed during field surveys and by camera surveys.

Mule deer are found throughout the Bishop Creek Project area at elevations from 4,000 feet up to and above 11,000-feet msl (SCE 2019). Mule deer are among the most abundant and conspicuous large mammals in North America. Mule deer are highly prized game animals, are important indicators of ecosystem health (Bleich et al. 2006) and have tremendous economic and aesthetic value (Loft 1998). Deer hunting is regulated by California state law through CDFW. A hunting license and a hunting tag are required to take mule deer, and only bucks with antlers with demonstrable forks (or greater) may be taken, except during special hunts. Antlers must be forked on one side in the upper two-thirds section of the antler.

The mule deer present in the Bishop Creek area are comprised of members of two adjacent herds: the Round Valley herd to the north and the Goodale herd to the south. Members of each herd move in and out of the Bishop Creek area, but there are a few who seem to be resident. Global positioning system (GPS) tracking studies conducted by CDFW revealed that little mixing occurs between the two herds. The Round Valley herd occupies the area along McGee Creek up to Humphry Basin and north. The Goodale herd occupies areas along the Middle and South Fork of Bishop Creek and southwards.

During the 2019 wildlife survey, an adult female mule deer and her fawn were observed at Bishop Creek Intake No.2 Dam along the south end of the lake. Deer vertebrae were observed within the Green Creek Diversion survey area and scat was observed at Bishop Creek South Fork Diversion Dam and Bishop Creek Power Plant No. 2 and Intake No. 3. Mule deer were also recorded by two trail cameras located at the wildlife crossing over the above ground flowline. CDFW GPS data suggests that Round Valley herd mostly stays north of the flowline, but occasionally use the crossing to move south. This data also shows that the Goodale herd moves northward to mix with the Round Valley herd. A review the movements show that the herds use the crossing as well as other pathways through the area but seem to avoid the human-use areas These data corroborate the camera findings by confirming that the mule deer in the area are using the wildlife crossings during times when humans are absent. Wildlife avoidance of humans in recreational areas is a well-documented phenomenon (e. g. Taylor and Knight 2003; George and Crooks 2006; Reed et al. 2019 and references cited therein).

The photographs taken from the camera stations document wildlife use from September 26 to November 9, 2019. This coincides with the timing of the fall migration of mule deer in the eastern Sierra Nevada. Mule deer spend the summer months at high elevation summer ranges, where there is a higher diversity and higher quality of foraging plants. Most mule deer migrate to lower elevations before the onset of severe winter weather to avoid getting trapped at the summer range (Monteith et al., 2011).

8.8.5 Biological Opinions, Status Reports, or Recovery Plans Pertaining to Listed Species

The USFWS released the Southwestern Willow Flycatcher Recovery Plan in 2002 (USFWS 2002), and the Sierra Nevada Bighorn Sheep Recovery Plan in 2007 (USFWS 2007). The Owens Tui chub is one of several species included in the 1998 Owens Basin Wetland and Aquatic Species Recovery Plan (USFWS 1998). Based on the wildlife study performed for this relicensing and a review of SCE's proposed operations under the new license, relicensing and operation of the Bishop Creek Project as proposed by SCE would not affect implementation of these recovery plans.

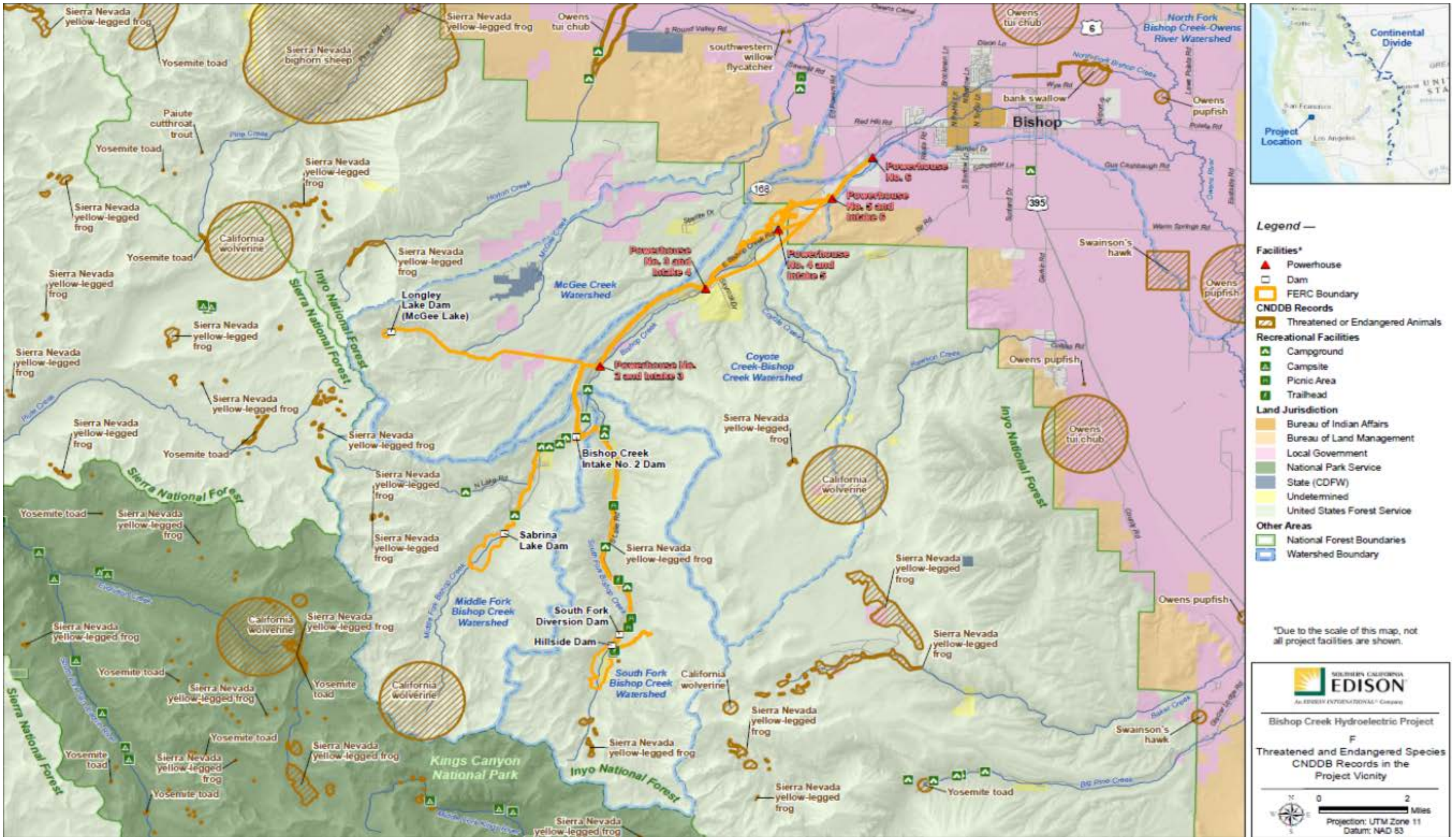

Figure 8.8-1. Threatened and Endangered Wildlife Species Recorded by CNDDB in the Bishop Creek Project Vicinity.

8.8.6 CRITICAL HABITAT

On August 26, 2016, the USFWS published the current *Final Rule* designating 750,926 acres of land as critical habitat for the Yosemite toad and 1,082,147 acres of land as critical habitat for the SNYLF in Alpine, Amador, Calaveras, El Dorado, Fresno, Inyo, Lassen, Madera, Mariposa, Mono, Nevada, Placer, Plumas, Sierra, Tulare, and Tuolumne counties, California (USFWS 2016c). On August 5, 2008, the USFWS published the current *Final Rule* designating approximately 417,577 acres of land as critical habitat for the Sierra Nevada bighorn sheep in Tuolumne, Mono, Fresno, Inyo, and Tulare counties, California (USFWS 2008). Critical habitat for Yosemite toad does not overlap the Bishop Creek Project boundary but does occur near the Bishop Creek Project boundary to the west of Longley Lake and Lake Sabrina (Figure 8.8-2).

USFWS-designated critical habitats for SNYLF and Sierra Nevada bighorn sheep overlap a small portion of the FERC Project boundary. Critical habitat for the SNYLF overlaps the just south of South Lake (Figure 8.8-2) and for the Sierra Nevada bighorn sheep it overlaps east of Longley Lake (Figure 8.8-2).

Critical habitat for the endangered Sierra Nevada Distinct Population segment of fisher exists in National Forest lands well outside of the Bishop Creek Project area on the west side of the Sierras in Fresno County.

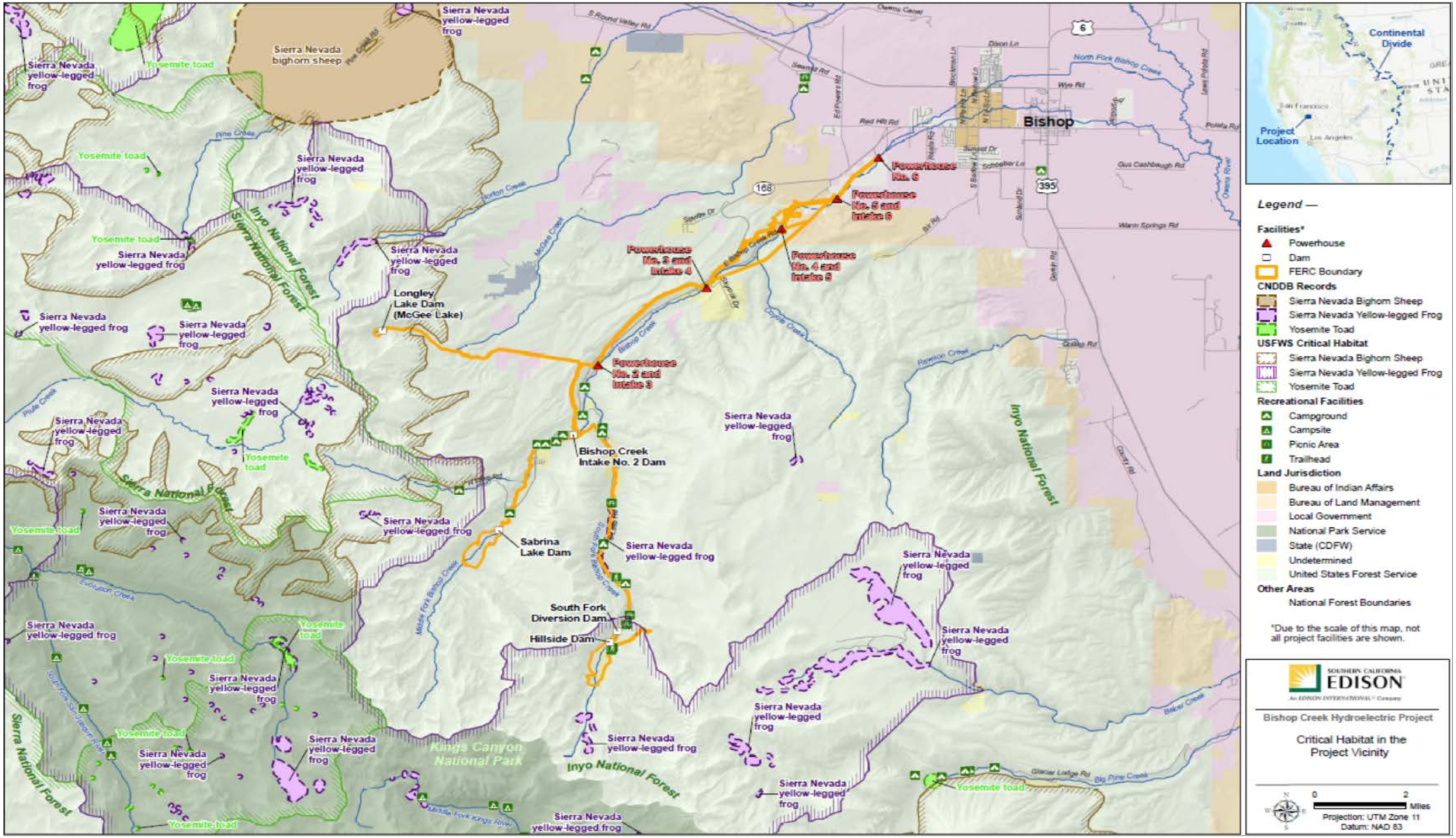

Figure 8.8-2. Critical Wildlife Habitat in the Bishop Creek Project Vicinity.

8.8.7 Additional Findings from Wildlife Study Reports (TERR 4)

The following project specific information provides additional information on the RTE or Special Status wildlife species in the project area.

8.8.7.1 Birds

Although known to fly over Bishop Creek Project facilities, the Project is not likely to adversely affect bald or golden eagles or their overall survival as a species. These species are not known to nest within the Bishop Creek Project boundary. The willow flycatcher including the southwestern willow flycatcher subspecies is one other listed bird species with the potential to occur in the Bishop Creek Project area, which may occur as a migrant stop-over. No current or historic records of this species have been found for the entire Bishop Creek Project area nor no suitable nesting habitat was located at Bishop Creek Project facilities or in areas subject to routine O&M. Additionally, no effects to riparian habitat are anticipated as part of ongoing Bishop Creek Project operations under the new license. Conversely, continued operation of the Bishop Creek Project is anticipated to contribute to the maintenance and potential expansion of the riparian community below Power Plant No. 4 under current flow release regimes (Section 8.7 on Riparian Vegetation). Therefore, the willow flycatcher would not likely be affected by Bishop Creek Project operations.

8.8.7.2 Amphibians

No Yosemite toad, northern leopard frog, or SNYLF were observed during relicensing studies and no historic or current recorded occurrences of Yosemite toad have been documented along Bishop Creek. Although there are historic records SNYLF in the Bishop Creek Project area, this species is considered to be extirpated from the Bishop Creek Project area. The Bishop Creek Project is not anticipated to affect these species. Based on the wildlife study performed for this relicensing, no critical habitat for Yosemite toad or the SNYLF would be affected by the Proposed Action.

8.8.7.3 Mammals: Bighorn Sheep

Sierra bighorn sheep may move through some high-elevation portions of the Bishop Creek Project boundary on a seasonal basis; critical habitat for the species overlaps with the Project boundary east of Longley Lake. Based on the wildlife surveys performed for the relicensing of the Bishop Creek Project and a review of the proposed Project operations, the Bishop Creek Project would not affect Sierra bighorn sheep or its designated critical habitat.

8.8.7.4 Owens-tui chub

As describes in Section 8.5.5, the Owens-tui chub has the potential to occur in the Bishop Creek Project area; and has been reported elsewhere in the Owens River watershed, well downstream from the Bishop Creek Project. Their preferred habitat is slow, low gradient reaches that are not typical of the Project, and fish distribution surveys conducted in 2019 did not detect any individuals (Kleinschmidt 2022).

8.8.8 Potential Adverse Effects and Issues

The following sections address potential effects as identified by the TSP and SD1 (Table 8.1-1). Based on the completed studies, and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action.

8.8.8.1 Effects of Project Operation and Maintenance on Federally Endangered Species and Designated Critical Habitat and Recovery Plans

Based on the botanical surveys performed for the relicensing of the Bishop Creek Project, no federally threatened or endangered plant species are known to occur within or adjacent to the Bishop Creek Project boundary. Therefore, the Bishop Creek Project would have no effect to federally threatened or endangered plant species.

Additionally, based on the review of available recovery plans, analysis of the Wildlife Study, and the Bishop Creek Fish Distribution Studies (see Volume 3), the Proposed Action would not affect implementation of recovery plans for Sierra Nevada big horn sheep, southwestern willow flycatcher, and Owens tui chub.

8.8.8.2 Effects of Continued Project Operations and Maintenance on Sensitive or Special-Status Plants in the Project Area

A total of six special status plant species were observed during surveys conducted in 2019 and 2020. All have a rarity rank with the CNPS. None are federal or state listed as threatened or endangered, but one species (frog's bit buttercup) is a Forest Service SCC. While observed within the FERC boundary, none were observed at any Bishop Creek Project facilities except for frog's-bit buttercup, associated with a rocky seep near the Birch Creek diversion.

While whitebark pine was previously reported 1.2 miles northwest and 1.3 miles southeast of Lake Sabrina, and 1.8 miles southeast of South Lake (Hillside) Dam, it was not observed in the survey area during 2019 and 2020 surveys. SCE will continue to collaborate with agencies as needed on this matter. While whitebark pine was not specifically targeted, all species observed during the surveys were recorded and listed in an appendix to the technical memorandum filed in 2020. A copy of the FTR, including appendices, can be found in Volume 3 of this DLA.

No Project affects to mule deer have been identified. SCE installed, and currently maintains two wildlife crossings and three guzzlers to support the mule deer population in the Bishop Creek Project vicinity. These are located along the above-ground flow along flowline road between Intake No. 2 and the standpipe for the Power Plant No. 2 Penstock. These crossings were shown to be effective in allowing mule deer movement over the flow line as well as allowing movement by other medium to large wildlife, such as mountain lion and grey fox. Mule deer mobility and that of other wildlife have not been impacted by the presence of the Bishop Creek Project facilities as demonstrated by the results of wildlife cameras installed in 2019 and 2020.

The Bishop Creek Project area provides a broad range of recreation opportunities available to the public year-round. Primary recreational opportunities include fishing, boating, camping, hiking, climbing, sightseeing, picnicking, horseback riding, mountain biking, off-highway vehicle riding, and cross-country skiing. Most of these activities take place outside and away from Bishop Creek Project facilities. Activities such as boating and fishing can take place at or near Bishop Creek Project-related facilities, such as South Lake, Lake Sabrina, and Intake No. 2. Wildlife and mule deer appear to have become accustomed to human presence in these areas. During the Wildlife Study performed for the relicensing of the Bishop Creek Project, the biologists did not observe mule deer at Project facilities. However, the trail cameras did capture mule deer moving through the deer crossing installed by SCE at night, in the early morning, and early evening. Although representing only a small portion of the Bishop Creek Project area, this may indicate that mule deer are avoiding the Bishop Creek Project and recreational areas during the times most used by recreationalists and SCE personnel.

Recreational facilities bring many visitors to the Bishop Creek Project area, which places many vehicles on Highway 168. Consultation with the California Department of Transportation (Caltrans) on vehicle versus mule deer collisions over a 10-year period, showed deer mortality due to collisions is less than 2 per year. This is significantly fewer than the 144 reported deer harvested in 2019 from recreational hunting (CDFW 2019).

It is recognized that for all species, special status rank may change during the term of the new license, and habitat conditions may change in the future such that species not observed during the 2019 and 2020 surveys may occur. Under the existing license, SCE has an Implementation Plan for Mitigation of Impacts to Sensitive or Endangered Plant and Animal Species. While no changes to Bishop Creek Project operations are proposed under the new license, therefore no impacts to species identified are anticipated, SCE will update that 1995 implementation plan for consistency with the INF Land Management Plan’s (2019) desired conditions, goals, and standards for SCC.

8.8.8.3 Consistency with the Inyo National Forest Land Management Plan

One forest SCC, that has a high special status rank with CNPS, and two additional plant species highly ranked by that organization, were observed within the FERC Project boundary during field surveys in 2019. All three plant species are associated with mesic habitat, but the fact that all of these species were observed within the existing FERC Project boundary as it is currently operated indicates that no adverse effects on these plants would be expected under the new license, consistent with the INF’s desired conditions for common and at-risk plant species (USDA 2019).

Three federally threatened or endangered wildlife species are known to occur within or adjacent to the Bishop Creek Project boundary. Relevant desired conditions relating to RTE or at-risk wildlife or botanical species with which the Project is consistent include:

- TERR-FW-DC 05: Ecological conditions contribute to the recovery of threatened and endangered species, conserve proposed and candidate species, and support the persistence of species of conservation concern

- SPEC-FW-DC 02: Habitats for at-risk species support self-sustaining populations within the inherent capabilities of the Land Management Plan area. Ecological conditions provide habitat conditions that contribute to the survival, recovery, and desilting of species under the ESA; preclude the need for listing new species; improve conditions for SCC including addressing threats (e.g. minimal impacts from disease); and sustain both common and uncommon native species.

- SPEC-FW-DC-03 states that "land management activities are designed to maintain or enhance self-sustaining populations of at-risk species within the inherent capabilities of the plan area by considering the relationship of threats (including site-specific threats) and activities to species survival and reproduction.

- SPEC-FW-DC-04 states "the structure and function of the vegetation, aquatic and riparian system, and associated microclimate and smaller scale elements (like special features such as carbonate rock outcrops, fens, or pumice flats) exist in adequate quantities within the capability of the plan area to provide habitat and refugia for at-risk species with restricted distributions.

- MA-CW-DC 01: Conservation watersheds provide high-quality habitat and functionally intact ecosystems that contribute to the persistence of SCC and the recovery of threatened, endangered, proposed, or candidate species.

- MA-RCA-DC 02: Riparian conservation areas have ecological conditions that contribute to the recovery of threatened and endangered species and support persistence of SCC as well as native and desired non-native aquatic and riparian-dependent plant and animal species.

Relevant species-specific desired conditions with which the Bishop Creek Project is consistent include:

- SPEC-SHP-DC 01: an adequate amount of suitable habitat supports persistent populations of bighorn sheep. These habitat patches include unforested openings supporting productive plant communities with a variety of forage species in and near adequate steep rocky escape terrain throughout the elevational range of mountain ranges. These areas meet different seasonal needs for each sex for feeding, night beds, birthing sites, lamb rearing, and migration routes between suitable habitat patches.

- SPEC-SHP-DC 02: The risk of disease transmission from domestic sheep and goats, including pack goats, to bighorn sheep (based upon the best available risk assessment model) is reduced to the maximum extent practicable.

Based on the TERR 3 results and a review of proposed Bishop Creek Project operations, the Project would have no effect to any federal or state special status wildlife or USFS at-risk wildlife, or the ecosystems that support such wildlife in the Bishop Creek Project area. Additional details regarding these desired conditions are included in the TERR 3 FTR (Volume 3). To support management of special status plants in the Bishop Creek Project Area, copies of geographic information system (GIS) data, photographs, populations, and sizes of special status plant species were submitted to the INF botanist in early 2021.

8.8.8.4 Proposed Mitigation and Enhancement Measures

Under the new license, SCE would continue to implement their existing plans; and add to them to or adapting as appropriate to be consistent with updated land management objectives. PME-5 and PME-6 are a Wildlife Management Plan and Botanical Resources Management, respectively, and are described further in Appendix A (Volume 2).

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8.9 RECREATION AND LAND USE

This section describes recreation resources associated with the Bishop Creek Project area. The discussion is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of Bishop Creek Project effects. For purposes describing and analyzing recreation and land use resources, the Project area is defined as the FERC Project boundary. The Bishop Creek Project area includes three recreation areas directly related to the Project: Lake Sabrina, South Lake, and Intake No. 2 Reservoir recreation areas.

The Bishop Creek Project is located in the central western portion of the INF, which stretches 165 miles north to south along the eastern Sierra Nevada Mountain Range. The INF includes an area with over 2 million acres of pristine lakes, winding streams, rugged peaks, and arid Great Basin Mountains (USFS, 2021a). Natural features include some of the world's oldest trees in Ancient Bristlecone Pine forest in the White Mountains, glaciers along the Sierra Nevada crest, and an elevational range from the tallest peak in the lower 48 states (Mt. Whitney at 14,494 feet) to semiarid deserts and valleys at 3,900 feet. This wide range in landscape provides for a diversity of recreation opportunities year-round. A total of 129 campgrounds and over 400 lakes and 1,100 miles of streams attract thousands of visitors during the summer months. Golden, brook, brown, and rainbow trout angling occurs throughout the area's streams and lakes. Sixty-five trailheads provide access to over 1,200 miles of trail in the 1.2 million acres of wilderness for hikers seeking to access undeveloped areas. Many resort facilities and pack stations operate under special use permits from the forest to serve additional visitor needs. Off-highway vehicle users can utilize over 2,200 miles of motorized routes. Mountain biking, climbing, camping, nature viewing, and photography are popular summer and fall activities. INF is a popular wintertime destination, and provides opportunities for snowshoeing, skiing, snowboarding, and snowmobiling. Opportunities for these activities include two ski areas, 25 miles of groomed Nordic ski trails, and 100 miles of groomed snowmobile trails (USFS, 2021a).

The INF contains nine congressionally designated wilderness areas: Hoover, Ansel Adams, John Muir, Golden Trout, Inyo Mountains, Boundary Peak, South Sierra, White Mountain, and Owens River Headwaters wildernesses. Devils Postpile National Monument, administered by the NPS, is located within the INF in the Reds Meadow area west of Mammoth Lakes.

Numerous other entities provide recreation opportunities just outside of the INF and in the Owens Valley below the Bishop Creek Project. Inyo County Parks and Recreation maintains 15 parks and campgrounds, and 7-day-use parks for residents and visitors (IC, 2021a). The city of Bishop offers the 44-acre Bishop City park, featuring a community garden, an arboretum, a pond (2) gazebos, and a dog park, (4) baseball fields, (2) children's play structures, (4) tennis courts, a public pool, an outdoor fitness center and a bocce court (City of Bishop, 2021). The BLM provides multiple campground facilities and access to hiking trails, bouldering, fishing, all-terrain vehicle trails, and nature viewing points within the Owens Valley (BLM, 2021).

8.9.1 Recreation in the Project Area

The Bishop Creek Project area provides a broad range of recreation opportunities available to the public year-round. Primary recreational opportunities include fishing, boating, camping, hiking, climbing, sightseeing, picnicking, horseback riding, mountain biking, off-highway vehicle riding, and cross-country skiing. The Bishop Creek Project boundary and adjacent lands are primarily within the INF, a portion of which is managed as a National Wilderness Area (John Muir Wilderness). Below are summaries of the major recreation facilities and opportunities found in the Bishop Creek Project watershed.

8.9.1.1 Camping

The White Mountain Ranger District of the INF operates and maintains recreation facilities and opportunities within the Bishop Creek Project watershed. The INF provides 12 campgrounds with 258 camping units in the Project watershed, two of which are group units accommodating up to 25 guests each (USFS, 2021b). These sites range from 6800-feet msl (Bitterbrush Campground) to 9300 feet msl (North Lake Campground) in the upper Bishop Creek Project area and provide a variety of amenities (

Table 8.9-1 and depicted in Figure 8.9-1).

Table 8.9-1 Inyo National Forest Camping Facilities in Project Watershed

Name	Type	Amenities	Sites	Open	Elevation (ft)
Big Trees Campground (CG)	Campground Camping	B/f	16	May-Oct	7,400
Bishop Park CG	Campground Camping	B/f	21	May-Oct	8,200
Bishop Park Group CG	Group Camping	No RV/B/R/f	1	May-Sep	8,200
Bitterbrush CG	Campground Camping	B/v	35	May-Oct*	6,800
Forks CG	Campground Camping	B/f	21	May-Oct	7,800
Four Jeffrey CG	Campground Camping	R/DS/f	104	May-Oct	8,100
Intake 2 CG	Campground Camping	B/f,v	16	May-Oct	8,200
Mountain Glen CG	Campground Camping	W/B/v	5	May-Sep	8,500
North Lake CG	Campground Camping	No RV/B/v	11	Jun-Sep	9,300
Sabrina CG	Campground Camping	B/v	19	May-Sep	8,900
Table Mountain Group CG	Group Camping	No RV/W/B/R/v	1	Jun-Sep	8,800
Willow CG	Campground Camping	B/v	8	May-Sep	9,000

Source: USFS, 2017

Legend: R – Reservations B – Bear Boxes W - Walk-in DS – Dump Station
Restrooms f –flush; v –vault; p –portable/pit Natural water is untreated stream or lake source
Elev.– Elevation in feet. Group Sites (max group size) Limit– Maximum stay allowed
*Camping allowed in winter; no water or trash service

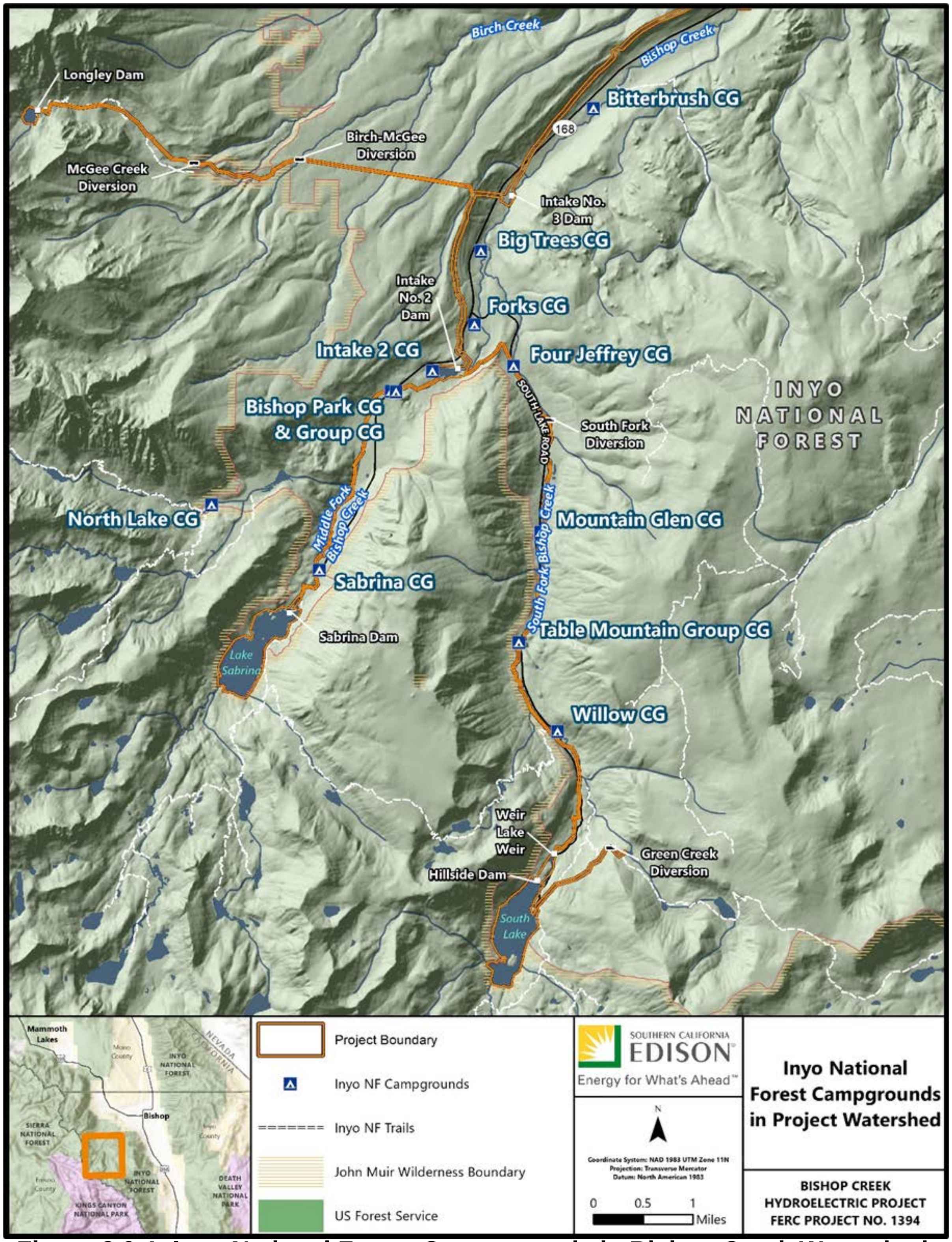

Figure 8.9-1. Inyo National Forest Campgrounds in Bishop Creek Watershed.

8.9.1.2 Trails

There are approximately 87.5 miles of trails (8.5 miles minimally developed, 54.8 miles moderately developed, and 24.2 miles developed) maintained by the INF and within the immediate proximity of the Bishop Creek Project (USFS, 2021c). Many of these trails provide access for lake, pond, or river fishing; horse riding; hiking or backpacking opportunities in the John Muir Wilderness. During the winter season, many of these trails offer ideal snowshoeing, cross country skiing, and back country skiing opportunities. Five trailheads are found either partially within or adjacent to the Bishop Creek Project boundary: Lake Sabrina, South Lake, Tyee Lakes, Longley Lake and Little Egypt trailheads. Lake Sabrina and South Lake trailheads provide access to the John Muir Wilderness and nearly 40 miles of trails and over 300 mountain lakes of varying sizes within the Bishop Creek watershed alone. Some of these trails extend over the Sierra Nevada crest and into the Sequoia-Kings Canyon Wilderness, connecting to the John Muir Trail. The Tyee Lakes Trailhead is located along South Lake Road. The Tyee Lakes Trail traverses 3.1 miles to Tyee Lakes and continues around Table Mountain another 3.6 miles to eventually connect with Lake Sabrina and associated trails. The Longley Lake Trailhead is located just outside the Bishop Creek Project boundary near the McGee Creek Diversion and provides access to a trail leading 2.3 miles through the John Muir Wilderness to Longley Lake. The Little Egypt Trail leads to the Little Egypt climbing area and further to Little Egypt Creek for a total of 1.7 miles. Trail users currently use parking facilities at Power Plant No. 3 and access the trail by crossing a footbridge just downstream of the power plant.

Overnight wilderness permits are available for overnight backpacking originating from the INF. INF maintains records by entry date, entry trailhead, and number of hikers (often capped by quota per day). Table 8.9-2 provides a summary of wilderness permit overnight use data for the period 2014 to 2018. While this is representative of overnight use in the forest, it must be noted that while many of the hikes originating from trailheads in the Bishop Creek Project watershed are loops or long-distance hikes that have hikers exit where they entered, use numbers do not account for hikers originating at a trailhead outside of the Project watershed and exiting in the Bishop Creek Project area.

Table 8.9-2. Inyo National Forest Wilderness Permit Use

LOCATION	PERMITS ISSUED	2014	2015	2016	2017	2018
Bishop Pass	Private	3,135	2,806	3,197	2,596	2,292
	Commercial	331	279	235	118	139
	TOTAL	**3,466**	**3,085**	**3,432**	**2,714**	**2,431**
Tyee Lakes	Private	123	108	170	103	176
	Commercial	-	10	-	-	-
	TOTAL	**123**	**118**	**170**	**103**	**176**
Lake Sabrina	Private	1,708	1,734	1,820	1,625	1,325
	Commercial	116	99	132	138	113
	TOTAL	**1,824**	**1,833**	**1,952**	**1,763**	**1,438**
George Lake	Private	91	119	182	96	136
	Commercial	-	-	-	-	-
	TOTAL	**91**	**119**	**182**	**96**	**136**
Lamarck Lake	Private	678	618	718	457	429
	Commercial	19	7	8	-	-
	TOTAL	**697**	**625**	**726**	**457**	**429**
Piute Pass	Private	2,249	2,342	2,307	1,807	1,716
	Commercial	244	251	232	119	240
	TOTAL	**2,493**	**2,593**	**2,539**	**1,926**	**1,956**

Source: USFS, 2018

Wilderness permit data does not account for the amount of day use certain wilderness trails receive from other hikers and fishermen. For this reason, the INF conducts periodic day use counts, typically in August, at Treasure Lakes, Main Bishop Pass and Sabrina Basin trails. All counts are conducted in the wilderness outside of developed front country facilities. For 2018, the INF estimated 300-day use hikers per week on Treasure Lakes Trail, 700-day use hikers per week on Main Bishop Pass Trail, and 900-day use hikers per week on Sabrina Basin Trail.

8.9.1.3 Climbing

The Bishop area is home to many popular rock climbing and bouldering areas, including Owens River Gorge, Alabama Hills, Pine Creek Crags, Happy and Sad Boulders and Buttermilk Country. According to MountainProject.com (REI, 2021), the Bishop area is host to approximately 345 trad, 786 sport, 23 top rope, and 1255 bouldering problems. Many climbing opportunities are adjacent to the Bishop Creek Project as well. Climbers informally use a paved parking area at SCE's Power Plant No. 3 to access the Little Egypt climbing area located along the ridge above the powerplant; Little Egypt climbing areas offers 24 trad, 24 sport, and 1 bouldering problems. Off Highway 168 and just below Lake Sabrina are Sheepherder Buttress (2 trad, 4 sport) and Cardinal Pinnacle (14 trad). Off South Lake Road and below South Lake are Parcher's Bluff (5 trad, 1 top rope), Bridge

Crag (2 trad, 1 top rope), and Wild Rose Buttress (4 trad, 1 sport). The peaks north of Bishop Pass and south of Piute Pass form the Bishop (accessible from South Lake Trailhead) and Evolution (accessible from Sabrina Basin Trailhead at Lake Sabrina) groups, feature 32 alpine, 30 trad, and 5 ice problems (REI, 2021).

8.9.1.4 Fishing

The CDFW tracks backcountry fishing locations within the Bishop Creek Project boundary and a total of 97 locations in the Project watershed (CDFW, 2021). Locations range from 7,900-feet msl (Intake No. 2) to 12,219-feet msl (Thompson Lake) along numerous stream and lake habitat, filled with a variety of fish species (brook trout, rainbow trout, brown trout, golden trout and hatchery trout). Many sites can be easily accessed by vehicle and have additional amenities such as restrooms, boat ramps and or wheelchair accessibility. Additionally, the opportunity for more remote, backcountry fishing is plentiful, and a large majority of these fishing locations can be accessed by the approximately 87.5 miles of trails maintained by the INF within the Bishop Creek Project watershed (USFS, 2021c).

Of the fishing locations tracked by the CDFW within the Bishop Creek Project boundary, four are located on Project reservoirs (South Lake, Lake Sabrina, Intake No. 2, Longley Lake) and two are along the free-flowing portions of the Middle Fork (between Lake Sabrina and Intake No. 2) and South Fork (between South Lake and South Fork Diversion) of Bishop Creek. CDFW actively stocks hatchery trout at five of these six Project locations, excluding only Longley Lake (CDFW, 2021). Additionally, the INF operates boating sites at Lake Sabrina and South Lake, both of which offer a launching ramp, marina, boat rental service, restroom and tackle shop. Table 8.9-3 provides a summary of CDFW's fishing location data, and Figure 8.9-2 shows both fishing and stocking locations as well as INF access trails to those sites.

Table 8.9-3. CDFW Fishing Location Data in the Project Watershed

Map ID[1]	Location	Last Stocked	Species Present	Size	Elevation (Feet MSL)
1	Lake Sabrina	2021	HT	186 Acres	9,000
2	South Lake	2021	HT	180 Acres	9,750
3	North Lake	2017	HT	20 Acres	9,255
4	Intake 2	2021	HT	15 Acres	7,900
5	Longley Lake	n/a	BT	10.23 Acres	10,693
6	South Fork Bishop Creek	2021	HT	5 Miles	8-9,000
7	Middle Fork Bishop Creek	2021	HT	4 Miles	8-9,000
8	Unnamed Lake #19629	n/a	BT	0.91 Acres	10,653
9	Rocky Bottom Lake	2016	RT	7.57 Acres	10,373
10	Funnel Lake	2016	HT	6.34 Acres	10,385
11	Green Lake	2016	RT	16.77 Acres	11,050
12	Brown Lake	2016	RT	2.85 Acres	10,696
13	Bluff Lake	n/a	RT	1.6 Acres	10,522
14	Marie Louise Lake, Upper	n/a	BT	0.69 Acres	10,617
15	Marie Louise Lake, Lower	n/a	BT	1.83 Acres	10,598
16	Inconsolable Lake	n/a	BT	0.78 Acres	10,958
17	Hurd Lake	n/a	BT,RT	2.49 Acres	10,319
18	Bull Lake	n/a	BT,RT	9.08 Acres	10,778
19	Chocolate Lake #1	n/a	BT	1.3 Acres	10,998
20	Chocolate Lake #2	n/a	BT	4.09 Acres	11,057
21	Chocolate Lake #3	n/a	BT	7.4 Acres	11,057
22	Long Lake	n/a	BT,RT,BrT	34.66 Acres	10,752
23	Ruwau Lake	n/a	BT,RT	25.74 Acres	11,040
24	Spearhead Lake	n/a	BT,BrT	2.11 Acres	10,978
25	Unnamed Lake #20826	n/a	BT	0.94 Acres	10,824
26	Margaret Lake (3rd)	n/a	BT	2.67 Acres	10,949
27	Unnamed Lake #20849	n/a	BT	0.11 Acres	11,070
28	Timberline Tarn #2	n/a	BT,RT	1.96 Acres	11,070
29	Timberline Tarn #1	n/a	BT,RT	2.49 Acres	11,047
30	Ledge (Phyllis) Lake	n/a	BT,RT	1.78 Acres	11,178
31	Saddlerock Lake	2016	BT	32.92 Acres	11,126
32	Unnamed Lake #20922	n/a	BT	0.09 Acres	11,218

MAP ID[1]	LOCATION	LAST STOCKED	SPECIES PRESENT	SIZE	ELEVATION (FEET MSL)
33	Bishop Lake	n/a	BT	17.62 Acres	11,247
34	Treasure Lakes	n/a	GT	4.83 Acres	10,667
35	Treasure Lake #1	n/a	GT	12.13 Acres	10,667
36	Tyee Lakes	n/a	BT,RT	3.86 Acres	10,319
37	Tyee Lakes	n/a	BT	1.81 Acres	10,598
38	Tyee Lakes	n/a	BT,RT	0.33 Acres	10,916
39	Tyee Lake #4	n/a	BT,RT	11.56 Acres	10,876
40	Tyee Lakes	n/a	BT,RT	11.91 Acres	11,011
41	Tyee Lakes	n/a	RT	3.14 Acres	11,027
42	Unnamed Lake #20444	n/a	BT	0.88 Acres	10,712
43	George Lake	n/a	BT	10.76 Acres	10,712
44	Blue Lake	n/a	BT,RT	30 Acres	10,398
45	Unnamed Lake #20547	n/a	BT	0.59 Acres	10,447
46	Donkey Lake	n/a	BT	7.81 Acres	10,598
47	Thompson Lake	n/a	BT	9.63 Acres	12,129
48	Sunset Lake	n/a	BT	24.77 Acres	11,460
49	Baboon Lakes	n/a	BT,RT	2.59 Acres	11,018
50	Baboon Lakes	n/a	BT,RT	0.43 Acres	10,998
51	Baboon Lake, Middle	n/a	BT	4.09 Acres	10,975
52	Baboon Lakes	n/a	BT	0.79 Acres	10,978
53	Baboon Lake, Lower	n/a	BT,RT	14.48 Acres	10,975
54	Echo Lake	2016	RT	46.29 Acres	11,607
55	Hungry Packer Lake	n/a	BT,RT	43.91 Acres	11,067
56	Moonlight Lake	n/a	BT	26.61 Acres	11,050
57	Sailor Lake	n/a	BT	1.41 Acres	10,998
58	Unnamed Lake #20600	n/a	BT	1.5 Acres	10,496
59	Midnight Lake	n/a	BT	17.75 Acres	10,985
60	Blue Heaven Lake	n/a	BT	19.19 Acres	11,818
61	Hell Diver Lakes	n/a	BT	2.2 Acres	11,756
62	Hell Diver Lakes	n/a	BT	1 Acre	11,336
63	Hell Diver Lakes	n/a	BT	2.91 Acres	11,359
64	Topsy Turvy Lake	n/a	BT,RT	7.26 Acres	10,798
65	Unnamed Lake #20570	n/a	BT	0.09 Acres	10,817

Map ID[1]	Location	Last Stocked	Species Present	Size	Elevation (Feet MSL)
66	Unnamed Lake #20565	n/a	BT	0.28 Acres	11,018
67	Pee Wee Lake	n/a	BT	0.93 Acres	10,978
68	Emerald Lakes	n/a	BT,RT	2.66 Acres	10,398
69	Emerald Lake #2	n/a	BT,RT	2.63 Acres	10,398
70	Emerald Lakes	n/a	RT	0.26 Acres	10,447
71	Emerald Lakes	n/a	RT	1.62 Acres	10,398
72	Emerald Lakes	n/a	RT	0.66 Acres	10,398
73	Dingleberry Lake	n/a	BT,BrT	5.09 Acres	10,486
74	Schober Holes	n/a	BT,GT	3.91 Acres	11,847
75	Schober Holes	n/a	BT	3.45 Acres	11,647
76	Bottleneck Lake	n/a	BT	10.73 Acres	11,119
77	Fishgut Lake #3	n/a	BT	4.16 Acres	10,998
78	Fishgut Lakes	n/a	BT	9.33 Acres	11,008
79	Fishgut Lakes	n/a	BT	1.49 Acres	10,896
80	Granite Lake	n/a	BT,RT	8.35 Acres	11,798
81	Grass Lake	n/a	BT	1.87 Acres	9,833
82	Lower Lamarck Lake	n/a	BT	15.57 Acres	10,657
83	Upper Lamarck Lake	n/a	BT,RT	39.88 Acres	10,913
84	Wonder Lake #1	n/a	BT	0.98 Acres	11,713
85	Wonder Lakes	n/a	BT	5.24 Acres	10,893
86	Wonder Lakes	n/a	BT	0.59 Acres	11,054
87	Wonder Lakes	n/a	BT	0.79 Acres	11,054
88	Wonder Lakes	n/a	BT	3.29 Acres	11,054
89	Unnamed Lake #20138	n/a	BT,RT	0.31 Acres	10,693
90	Loch Leven Lake	n/a	BT,RT,BrT	10.85 Acres	10,739
91	Unnamed Lake #20119	n/a	BT,RT	0.46 Acres	10,775
92	Unnamed Lake #20103	n/a	BT,RT	3.1 Acres	10,775
93	Unnamed Lake #20095	n/a	BT,RT	0.5 Acres	10,775
94	Unnamed Lake #20084	n/a	BT,RT	1.41 Acres	10,893
95	Unnamed Lake #20086	n/a	BT,RT	0.22 Acres	10,936
96	Piute Lake	n/a	BT,RT	21.58 Acres	10,952
97	Emerson Lake	n/a	BT	6.51 Acres	11,214

Source: CDFW, 2021

[1]Note that the Map ID listed in this table corresponds to the label for each site on Figure 8.9-2.
BT = Brook Trout, BrT = Brown Trout, GT = Golden Trout, HT = Hatchery Trout, RT = Rainbow Trout

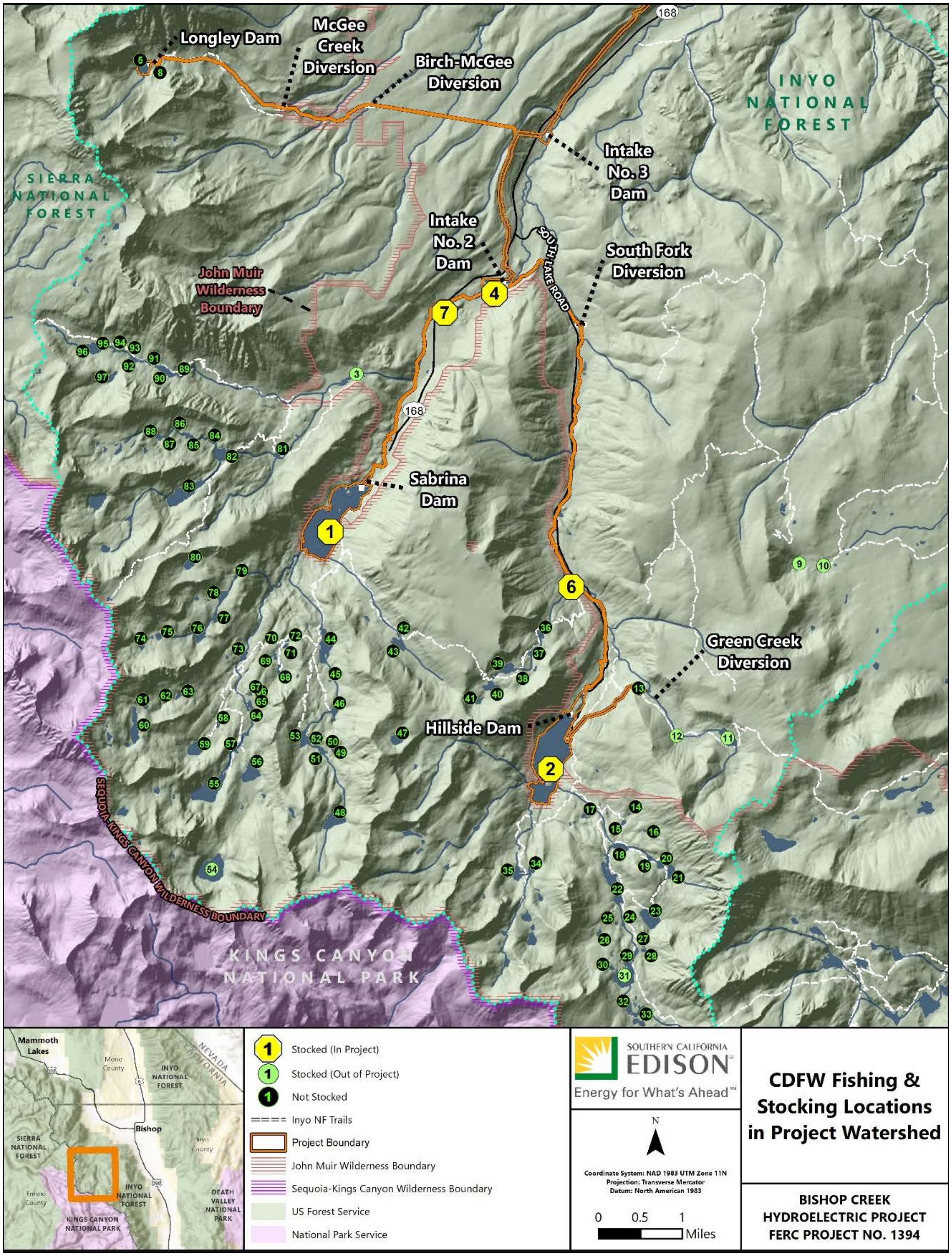

Figure 8.9-2. CDFW Fishing and Stocking Locations in the Project Watershed.

8.9.2 Recreation Opportunities at Project Facilities

The Bishop Creek Project consists of five developments, Power Plant Nos. 2, 3, 4, 5 and 6. Early stakeholder engagement and FERC scoping identified the need to conduct a Recreation Facilities Condition and Public Accessibility (REC 2) study to assess the condition of and accessibility to existing recreation facilities at the Project. For the purposes of the study, Project-related recreation facilities were considered to be all facilities related to the South Lake, Lake Sabrina, and Intake No. 2 recreation areas. Results of the study are generally incorporated into the appropriate sections below. More specific data regarding the REC 2 study is provided in the FTR in Volume 3 of this DLA.

8.9.2.1 Intake No. 2

Intake No. 2 Reservoir is located at approximately 8,100-feet above msl, approximately 12 miles west of Bishop along Highway 168, and has a surface area of approximately 15 acres. Developed recreation facilities within the Bishop Creek Project boundary at Intake No. 2 Reservoir include a fishing pier, picnic tables, BBQ grills, and camping facilities associated with Lower Intake No. 2 campground. Other parking, restroom, and recycling facilities are located just outside of the Bishop Creek Project boundary. These facilities are owned and operated by the INF Service or its concessionaires. The site is open seasonally and no use fees are collected by the INF to access the fishing pier. Additionally, the INF's Upper Intake 2, Bishop Park, Bishop Park Group, Four Jeffrey, Forks and Big Trees campgrounds are all located outside of the Bishop Creek Project boundary and less than 2 miles from Intake No. 2 Reservoir.

Roads and parking facilities at Intake No. 2 consist of asphalt paved access drives and earthen/gravel paved parking access. Asphalt paved surfacing has been repaired numerous times with crack sealers and patches. The edges of the asphalt paved surfaces are eroded. Results of the REC 2 study noted than an entire asphalt overlay should be considered. The REC 2 study described the condition for other site elements, including the fishing pier, picnic tables, restroom, and BBQ grills. These amenities were all in good condition. It was noted that accessibility is limited for some amenities in the recreation area. Amenities that may require additional accessibility for Americans with Disabilities Act (ADA) include the fishing pier, picnic areas, shoreline/beach access areas, recycling/trash receptacles, water hydrant, fee deposit post, and restrooms. Overall, the fishing pier, picnic tables, and water hydrant were noted as needing repairs or replacement.

Dispersed use was assessed at all sites during the REC 2 study. Four distinct concentrations of dispersed use were observed at the Intake No. 2 Reservoir:

- Area A: Northern shoreline of the reservoir and Intake No. 2 Dam
- Area B: Day use area on western shoreline of the reservoir
- Area C: Use along Middle Fork Bishop Creek just upstream of its confluence with Intake No. 2 Reservoir

- Area D: Southeastern shoreline of the reservoir

Observations resulted in an estimate of approximately five potential campsites; 1.0 mile of user created trails; 61 visibly evident bank access points; and 0.7 mile of shoreline used for bank fishing or general recreation.

8.9.2.2 Lake Sabrina

Lake Sabrina is located at approximately 9,100-feet msl, approximately 18 miles west of Bishop at the end of Highway 168, and has a surface area of approximately 195 acres. Developed recreation amenities generally included a boat ramp, piers, marina, fish cleaning station, restroom, and trailhead for Sabrina Basin Trail, all of which are owned and operated by the INF Service or its concessionaires. Only the boat launch and launching piers are currently located within the Bishop Creek Project boundary. The site is closed seasonally (weather dependent) and no use fees are collected by the INF for boat launching (USFS, 2021b).

Lake Sabrina Road provides sole vehicular access to the Lake Sabrina Recreation Area. Parking consists of two paved parking lots near the marina and seven non-paved, day use parking areas. Paved surfaces consist of asphalt paving, and non-paved surfaces consist of compacted native earthen materials that have naturally occurring, decomposed crushed aggregate mixed with soil material. Observations during the REC 2 study noted that a majority of paved surfaces at Lake Sabrina are in fair condition, with some cracks, areas of alligator cracking, eroding edges, and occasional potholes. Observations during the study noted that both parking lots need to be re-striped and the addition of ADA accessible parking stalls.

Amenities at Lake Sabrina include a boat ramp, portable boat slips/docks, fixed gangways, a fish cleaning station, trash receptacles, recycling receptacles, and a dumpster. Two buildings are located at the site; the Lake Sabrina Boat Landing building and the restroom building located at one of the parking lots. The boat landing building was noted to be in good condition, with no obvious maintenance or repair needs. The parking lot restroom building was also noted to be in good condition. ADA accessibility issues were observed at several amenity locations, including lake/shoreline beach access, boat launch/docks, recycling/trash receptacles, parking areas (no designated spaces), viewing areas/dam overlook, fish cleaning station, and trailheads/trails. Additionally, the portable boat slips/docks, fixed gangways, fish cleaning station, trash and recycling receptacles, and marina guardrails/handrails were noted as either needing repairs or replacement.

Dispersed use was assessed at all sites during the REC 2 study. Five distinct concentrations of dispersed use were observed at Lake Sabrina:

- Area A: Shallow impoundment upstream of the weir below Sabrina Dam

- Area B: Northwest shoreline of Lake Sabrina and Sabrina Dam

- Area C: Inlet Trail
- Area D: Peninsula on the western shoreline of Lake Sabrina at the approximate midpoint of the lake and along Inlet Trail
- Area E: Middle Fork Bishop Creek inlet and shoreline located at the southern end of Lake Sabrina

Observations resulted in an estimate of approximately 47 potential campsites; 6 fires pits; 2.0 miles of user created trails; 20 visibly evident bank access points; and 1.3 miles of shoreline used for bank fishing or general recreation.

8.9.2.3 South Lake

South Lake is located at approximately 9,800-feet msl, 21 miles west of Bishop along Highway 168 and South Lake Road, and has a surface area of approximately 109 acres. Developed recreation amenities at South Lake include a single-lane boat launch, pier, marina, restrooms, picnic tables, and trailheads for the Bishop Pass and Rainbow Pack Station Trails, all of which are owned and operated by the INF Service and its concessionaires. Only the boat launch and associated launching pier are fully within the Bishop Creek Project boundary. The site is open June-October and use fees are collected by the INF as donations only (USFS, 2021b).

Roads at South Lake consist of an access road, as well as four paved parking lots. All road and parking surfaces have been resurfaced during recent years and are in excellent condition. One restroom is located at the Bishop Pass Trailhead and was determined to be in excellent condition. A second restroom is located across from the stairs providing access to the launching pier and is need of repair and maintenance and upgrades to provide universal accessibility. The marina (South Lake Landing) was reviewed based on a visual assessment of the exterior; the structure was in good condition but may require new shingles on the roof in the coming years. Some modifications to the ramp and earthen path are needed to accommodate ADA accessibility. The floating launching piers and adjacent boat launch facility also did not meet ADA requirements. Picnic tables, stairs to the launching pier, the boat ramp vehicular access gate, and the vehicular access gate at the trailhead are also in need of repair.

Dispersed use was assessed at all sites during the REC 2 study. Eight distinct concentrations of dispersed use were observed at South Lake:

- Area A: Hillside Dam and Spillway
- Area B: Green Creek Diversion Pipeline
- Area C: Main recreation area
- Area D: Use along the southern shoreline of South Lake

- Area E: General use of the shoreline and areas around the southern inlets to Lake Sabrina
- Area F: Use along the southern shoreline of South Lake
- Area G: Use on the island in the southern portion of South Lake
- Area H: Use along the southern shoreline of South Lake

Observations resulted in an estimate of approximately 82 potential campsites; 20 fire pits; 1.9 miles of user created trails; and 1.0 miles of shoreline used for bank fishing or general recreation.

8.9.3 2021 Recreation Use Surveys

Early stakeholder engagement and FERC scoping identified the need to conduct a Recreation Use and Needs (RUN) Study (REC 1) to evaluate current recreational use and future recreational needs for the Bishop Creek Project. As summarized in the Draft Technical Report (Volume 3), extensive consultation between SCE and TWG members, followed FERC's Study Plan Determination as implementation of the study adjusted to a variety of unanticipated conditions.

In January 2020, due to unanticipated construction activity along South Lake Road, SCE and the USFS concluded that any surveys conducted under the REC 1 study plan during the 2020 recreation season would not provide a representative sample of use and should thus be postponed. Ensuing complications from the Coronavirus Disease (COVID-19) pandemic and historic wildfires in the area further confirmed this decision. As a result, in-person surveys and spot, traffic, and trail counts were rescheduled for the 2021 recreation season with the expectation that conditions would improve. The study was further modified to include develop off-site surveys that, while more general in nature than the on-site surveys, would target questions directly related to use, avoidance of use, or for use in the Bishop Creek Project area. Although SCE maintained that off-site surveys had no direct nexus to the Bishop Creek Project, SCE agreed to take a lead role in the implementation, collection, and analysis of these off-site surveys as part of the REC 1 study. The continuation of the COVID-19 pandemic into the 2021 recreation season, and forest closures in response to wildfires in 2021 resulted in further modifications to the methods, in consultation with the Recreation TWG.

The following sections summarize data from the Draft Recreation Use and Needs Assessment (Volume 3); this report is being distributed with the DLA and interpretation of key findings will be review with the Recreation TWG.

8.9.3.1 Day Use

The Draft Technical Report for REC 1 provides details on demographics, typical duration of use, and patterns of use by month and day. Figure 8.9-3 shows the breakdown of recreational activities used by survey respondents. More than half of the respondents

(54.3 percent) were over the age of 55 and have visited the area for an average of 23 years. Most respondents spend 2 to 5 days (31.9 percent), 6 to 10 days (21.1 percent), or 11 to 20 days (25.9 percent) per year visiting the area. Respondents typically visit the area most heavily in the months of May through October, with a peak in July and August, where 82.0 percent and 83.5 percent, respectively, of respondents typically visit. Usage by day of the week is relatively arbitrary, although there is a slight uptick in typical use for the weekend (Friday, Saturday, and Sunday). Respondents typically visit the area between the hours of 8 a.m. and noon (83.9 percent) or noon and 4 p.m. (64.8 percent) and for a duration of 4 to 8 hours (36.3 percent).

Based on user responses (Figure 8.9-43), most users have recreated at Lake Sabrina (89.5 percent) and South Lake (90.7 percent) recreation areas, and a little more than half (54.8 percent) of the respondents have recreated at Intake No. 2 Recreation Area. The most popular recreational activities at the Bishop Creek reservoirs are hiking/trail use (88.1 percent), viewing scenery (61.6 percent), fishing (56.1 percent), photography (55.2 percent), relaxing (54.3 percent), Camping (53.4 percent), and viewing wildlife (48.8 percent).

Overall satisfaction with day use facilities at all reservoirs was predominantly neutral or very Satisfied (Table 8.9-4). Weighted averages for satisfaction resulted in neutral to very satisfied scores for South Lake (3.6), Lake Sabrina (3.4), and Intake No. 2 Reservoir (3.2).

Table 8.9-5 through

Table 8.9-7 summarize additional findings with respect to satisfaction, perceived condition, crowdedness, adequacy of day use facilities, and number of facilities.

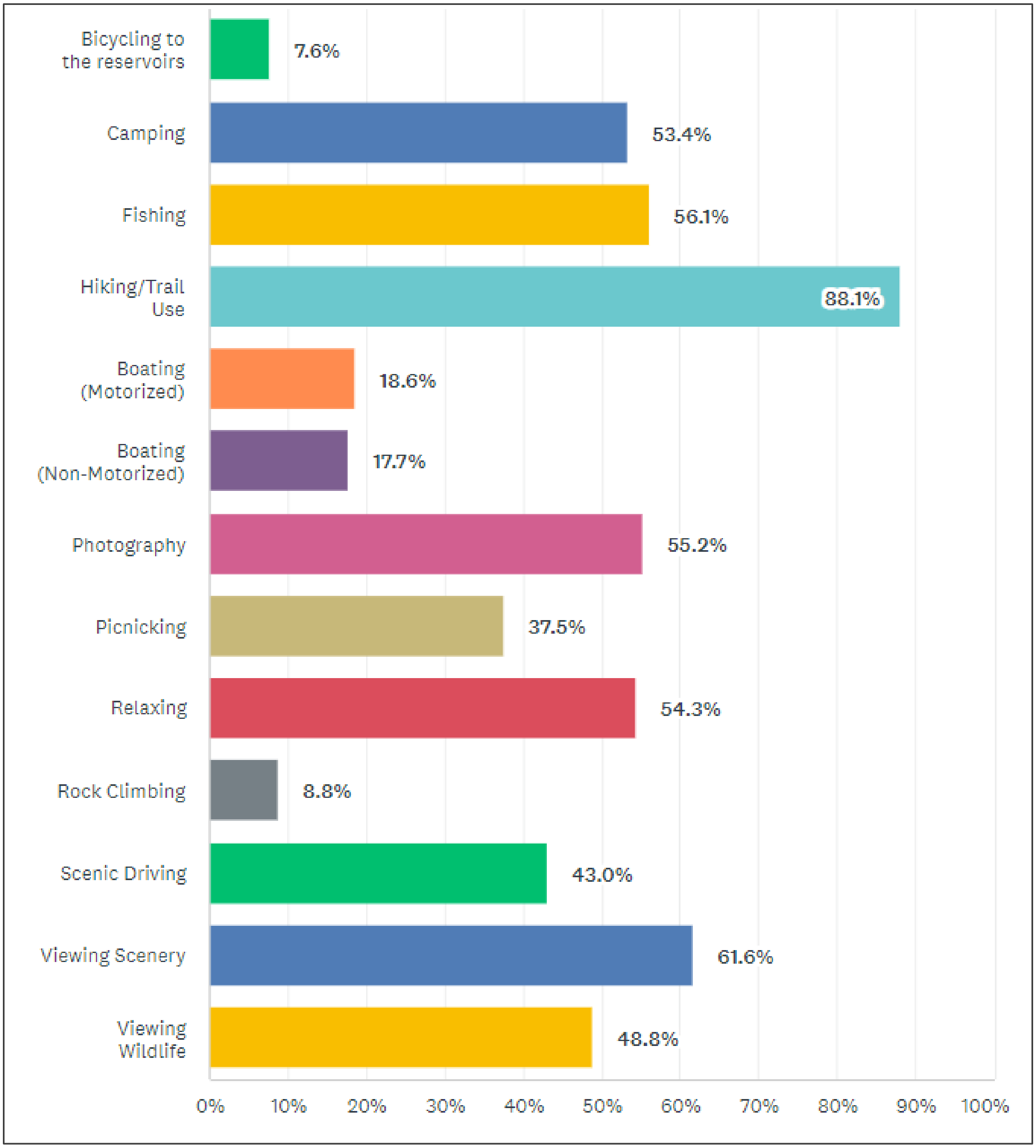

Figure 8.9-3. Respondents' Recreational Activities.

Table 8.9-4. Overall Satisfaction with Day Use Facilities (Rating 1 to 5)[a]

Recreation Area	1	2	3	4	5	N/A	Weighted Average
	Not at All Satisfied	Slightly Satisfied	Neutral	Very Satisfied	Extremely Satisfied		
Lake Sabrina	3.7% (3.9%)[b]	14.5% (15.4%)	27.4% (29.0%)	37.8% (40.1%)	10.8% (11.5%)	5.7%	*3.4*
South Lake	4.4% (4.6%)	10.1% (10.5%)	25.8% (27.0%)	39.6% (41.4%)	15.8% (16.5%)	4.4%	*3.6*
Intake No. 2 Reservoir	3.5% (5.1%)	9.5% (13.6%)	27.6% (39.4%)	25.4% (36.4%)	3.9% (5.6%)	30.0%	*3.2*

[a]Rating scale of 1 to 5

[b] Data within parentheses represent percentage of actual ratings given, excluding those that marked an answer as not applicable.

Table 8.9-5. Overall Condition of Day Use Facilities[a]

Recreation Area	1	2	3	4	5	N/A	Weighted Average
	Poor		Average		Excellent		
Lake Sabrina	5.8% (6.1%)[b]	9.5% (10.1%)	48.5% (51.6%)	18.6% (19.9%)	11.5% (12.3%)	6.1%	*3.2*
South Lake	5.7% (6.0%)	5.7% (6.0%)	41.8% (43.9%)	22.7% (23.9%)	19.4% (20.3%)	4.7%	*3.5*
Intake No. 2 Reservoir	6.2% (8.8%)	6.9% (9.8%)	39.6% (56.2%)	9.1% (12.9%)	8.7% (12.4%)	29.5%	*3.1*

[a]Rating scale of 1 to 5

[b] Data within parentheses represent percentage of actual ratings given, excluding those that marked an answer as not applicable.

Table 8.9-6. Perception of Crowdedness[a]

Recreation Area	1	2	3	4	5	N/A	Weighted Average
	Never Crowded		Sometimes Crowded		Always Crowded		
Lake Sabrina	3.0% (3.3%)[b]	4.1% (4.4%)	48.0% (51.8%)	20.3% (21.9%)	17.2% (18.6%)	7.4 %	*3.5*
South Lake	2.3% (2.5%)	6.3% (6.7%)	44.0% (46.8%)	16.3% (17.4%)	25.0% (26.6%)	6.0 %	*3.6*
Intake No. 2 Reservoir	0.0% (0.0%)	5.6% (8.2%)	26.7% (39.2%)	16.5% (24.2%)	19.3% (28.4%)	31. 9%	*3.7*

[a]Rating scale of 1 to 5
[b] Data within parentheses represent percentage of actual ratings given, excluding those that marked an answer as not applicable.

Table 8.9-7. Number of Day Use Facilities

Facility	1	2	3	4	5	N/A	Weighted Average
	Too Few		About Right		Too Many		
Restrooms	20.4% (20.9%)[a]	16.8% (17.2%)	59.5% (61.1%)	0.7% (0.7%)	0.0% (0.0%)	2.6 %	*2.4*
Vehicle Parking	38.2% (38.6%)	20.6% (20.8%)	38.6% (38.9%)	1.0% (1.0%)	0.7% (0.7%)	1.0 %	*2.0*
Trailer Parking	21.0% (40.5%)	5.2% (10.1%)	21.0% (40.5%)	1.1% (2.0%)	3.5% (6.8%)	48.3 %	*2.2*
Picnic or Day Use Areas	15.8% (18.4%)	18.2% (21.2%)	50.8% (59.2%)	0.7% (0.8%)	0.3% (0.4%)	14.1 %	*2.4*
Boat Launches	3.4% (5.6%)	3.8% (6.2%)	49.3% (81.4%)	2.4% (4.0%)	1.7% (2.8%)	39.4 %	*2.9*
Public Docks	10.9% (18.3%)	9.5% (16.0%)	37.0% (62.1%)	0.4% (0.6%)	1.8% (3.0%)	40.5 %	*2.5*
Hiking Trails	7.3% (7.5%)	11.2% (11.6%)	72.9% (75.4%)	4.0% (4.1%)	1.3% (1.4%)	3.3 %	*2.8*
Swim Areas	16.9% (29.2%)	6.6% (11.3%)	32.4% (56.0%)	0.3% (0.6%)	1.7% (3.0%)	42.1 %	*2.4*
Signage	8.8% (9.6%)	10.1% (11.1%)	67.7% (74.4%)	2.7% (3.0%)	1.7% (1.9%)	9.1 %	*2.8*
Fish Cleaning Stations	19.7% (35.2%)	8.0% (14.2%)	24.9% (44.4%)	1.4% (2.5%)	2.1% (3.7%)	43.9 %	*2.3*

[a] Data within parentheses represent percentage of actual ratings given, excluding those that marked an answer as not applicable.

8.9.3.2 Fishing

Fishermen at the reservoirs appear to frequent a variety of locations (reservoirs and creeks) in the Bishop Creek Project area (Figure 8.9-4), as more than half of all respondents have fished at all locations except Weir Lake, where only 22.1 percent of respondents typically fish. Perception of crowdedness of fishing areas varies depending on location, but indicate that Intake 2 faces the most pressure.

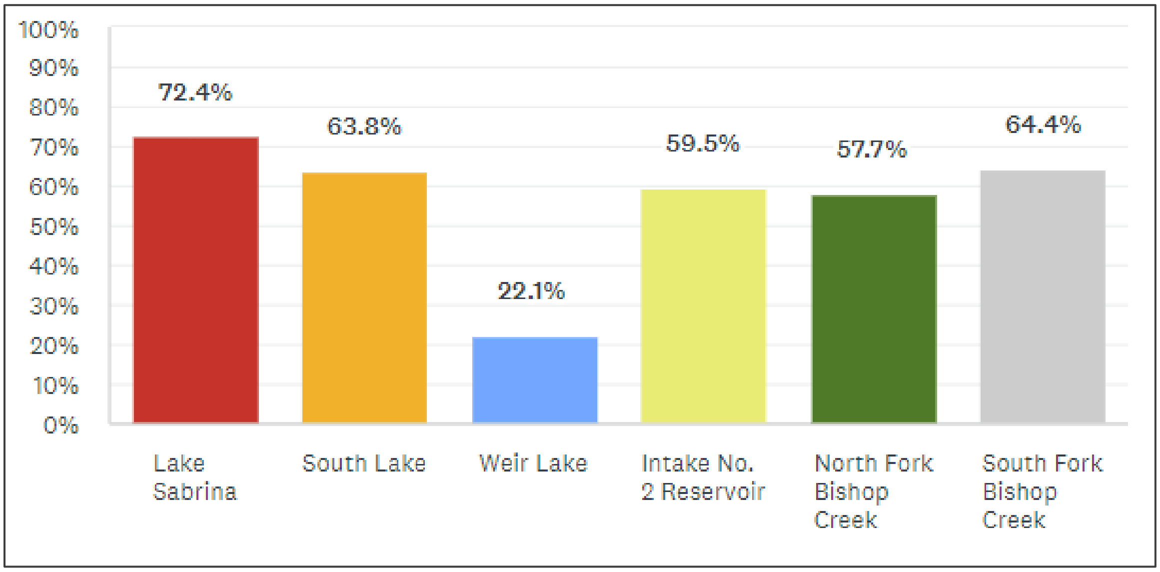

Figure 8.9-4. Where Respondents Typically Spend Time Fishing.

8.9.3.3 Campgrounds

Of the individuals surveyed at the Bishop Creek Project reservoirs, there was a strong preference for utilizing overnight facilities at the reservoirs if they were available. Most (62.5 percent) have stayed at developed campgrounds in the area. Factors that prevented some respondents from utilizing developed campgrounds included challenges with booking or perceptions of crowdedness. Of those staying in the campgrounds, the overall satisfaction with developed campgrounds ranked as follows: very satisfied (50.6 percent), neutral (21.3 percent), extremely satisfied (12.9 percent), slightly satisfied (12.9 percent), and not at all satisfied (1.7 percent). The weighted average of these responses was 3.6. The condition, management, and cleanliness of developed campgrounds was predominantly ranked from average to excellent with a weighted average of 3.7. Table 8.9-8 and Table 8.9-9, respectively, summarize the respondents' ranking of satisfaction and perceptions of condition.

Table 8.9-10 provides an indication that the overall number of campgrounds is adequate, notwithstanding concerns about crowdedness (Table 8.9-11) The proximity of the campground to the respondent's preferred activity is described in Table 8.9-12.

Table 8.9-8. Overall Satisfaction with Developed Campgrounds

	1 Not at All Satisfied	2 Slightly Satisfied	3 Neutral	4 Very Satisfied	5 Extremely Satisfied	N/A	Weighted Average
Responses	1.7%	12.9%	21.3%	50.6%	12.9%	0.6%	3.6

Table 8.9-9. Condition, Management, and Cleanliness of Developed Campgrounds

	1	2	3	4	5	N/A	Weighted Average
	Poor		Average		Excellent		
Responses	3.9%	3.4%	36.9%	26.3%	29.1%	0.6%	*3.7*

Table 8.9-10. Rating of Number of Campgrounds Near Bishop Creek Reservoirs

	1	2	3	4	5	Weighted Average
	Too Few		About Right		Too Many	
Responses	14.2%	18.2%	61.4%	4.5%	1.7%	*2.61*

Table 8.9-11. Perception of Crowdedness at Campgrounds

	1	2	3	4	5	N/A	Weighted Average
	Never Crowded		Sometimes Crowded		Always Crowded		
Responses	0.6%	10.7%	49.2%	17.5%	21.5%	0.6%	3.5

Table 8.9-12. Importance of Proximity of Campgrounds to Preferred Recreational Activity

	1	2	3	4	5
	Extremely Important	Very Important	Somewhat Important	Not So Important	Not at All Important
Responses	22.3%	36.9%	31.8%	6.7%	2.2%

8.9.3.4 Hiking and Wilderness Access

Based on user response, 88.5 percent of respondents indicated they have used trailheads at the Bishop Creek reservoirs (e.g., Sabrina Basin Trailhead; Bishop Pass Trailhead) to access the John Muir Wilderness. Of those that have used the trails, 84.6 percent have used the trailheads for day use and 62.5 percent have used the trailheads for overnight use in the wilderness. Users were asked to briefly describe where and how they parked their vehicle before access.

8.9.3.5 Traffic and Use Counts

Figure 8.9-5 provides a graphical representation of the total daily vehicle counts and notable events that occurred during the study season that may have influenced user activity. Consistent peaks are associated with weekend use throughout the study season, with more pronounced peak use during holiday weekends and the weeks of CDFW fish stocking. Very high usage is noted during October compared to the prior months, presumably in response to prolonged closure of the area and fish stocking. Usage troughs are associated with week days, as well as periods of no user activity where access was precluded by forest and gate closures due to fire response, inclement weather, and road damage.

On average, an estimated 9,327 users visited the three recreation areas each week during the study season (1,905 at Intake No. 2; 3,630 at Lake Sabrina; and 3,792 at South Lake). The highest average use was on weekend days (Friday daily average of 1,437 users; Saturday daily average of 1,961 users; and Sunday average of 1,523 users) with the lowest usage Monday to Wednesday (Monday averaged 1,029 users and Wednesday averaged 1,052 users). As expected, for all sites, traffic increases during the morning as early users arrive, peaks midday, and decreases throughout the evening as users leave the site (Draft Technical Report, Volume 3).

As shown on Figure 8.9-5Figure 8.9-5, daily averages tend to increase beginning in June as peak recreation season ramps up and taper off in August/September. Average number of vehicles and estimated users are provide by month are shown Table 8.9-14.

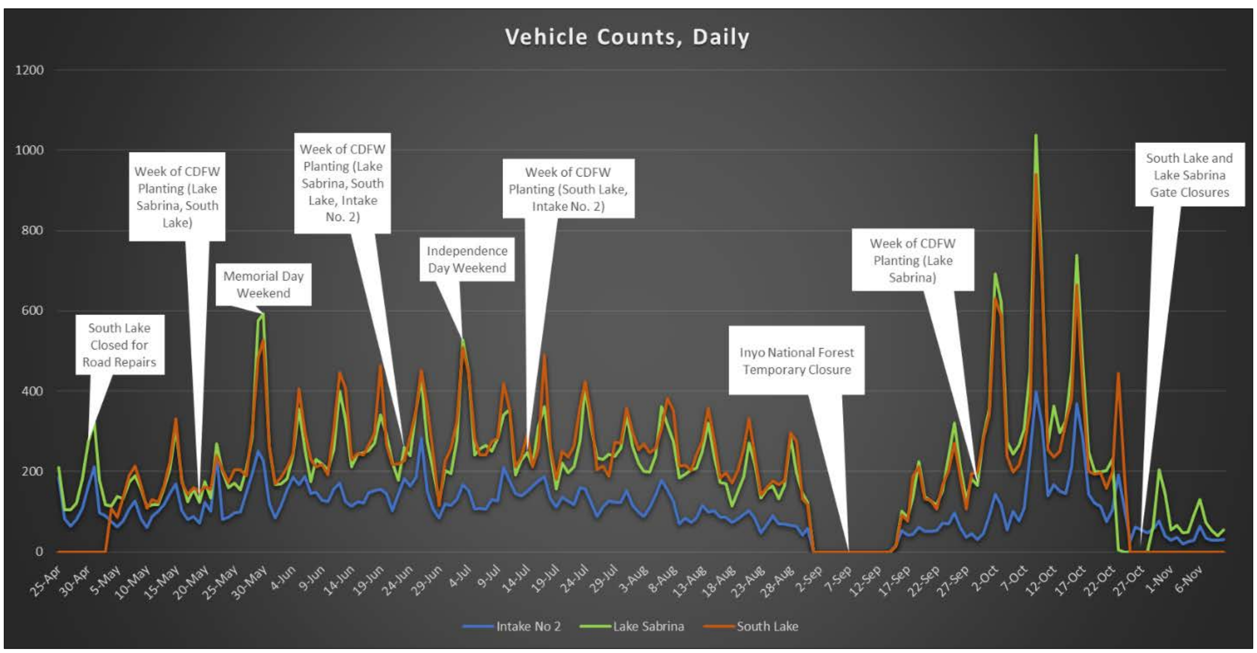

Figure 8.9-5. Total Vehicle Counts, Daily.

Table 8.9-13. Daily Average Vehicle Counts and Estimated Users by Day of the Week

Day of Week	Intake No 2.		Lake Sabrina		South Lake	
	Daily Avg. (Vehicles)	Daily Avg. (Users)	Daily Avg. (Vehicles)	Daily Avg. (Users)	Daily Avg. (Vehicles)	Daily Avg. (Users)
Sunday	134.0	335.0	333.2	832.9	325.9	814.7
Monday	84.9	212.3	197.5	493.8	189.0	472.4
Tuesday	92.0	230.1	209.4	523.5	201.0	502.4
Wednesday	91.7	229.4	198.1	495.2	191.1	477.8
Thursday	102.2	255.4	217.2	542.9	218.8	547.0
Friday	131.3	328.2	284.0	710.1	267.0	667.6
Saturday	171.4	428.5	418.7	1046.7	423.3	1058.2

Table 8.9-14. Daily Average Vehicle Counts and Estimated Users by Month

Month	Intake No 2.		Lake Sabrina		South Lake	
	Monthly Avg. (Vehicles)	Daily Avg. (Users)	Daily Avg. (Vehicles)	Daily Avg. (Users)	Daily Avg. (Vehicles)	Daily Avg. (Users)
April[a]	114.0	285.0	166.1	415.2	0.0[c]	0.0
May	120.1	300.3	203.5	508.8	204.1	510.2
June	145.8	364.4	251.1	627.8	274.3	685.8
July	138.0	345.1	276.3	690.6	295.0	737.5
August	90.9	227.1	208.2	520.6	237.7	594.4
September	51.5	128.8	164.4	410.9	159.3	398.3
October	140.0	350.1	360.3	900.8	356.0	890.1
November[b]	32.4	81.0	66.2	165.5	0.0[d]	0.0

[a] Traffic counters only recorded data for the last 6 days of April 2021.
[b] Traffic counters only recorded data through November 10, 2021.
[c] South Lake Road was closed from April 24 to May 4, 2021, due to road damage and repairs.
[d] South Lake Road was closed from October 25 to November 10, 2021, due to inclement weather.

8.9.3.6 Trail Counts

Trail counters were utilized to determine general patterns of use in three areas: The Little Egypt Climbing Area, the Green Creek diversion pipeline at South Lake, and the Inlet Trail at Lake Sabrina. Table 8.9-15 describes the average number of hikers detected on each trail by day of the week. Peak months for trail usage where in the June and July timeframes, although it is likely that closures of the forest in late August and early September due to wildfires likely impacted the data. For example, use of the Little Egypt climbing area increased during the closure as it was outside of the Forest's administrative control (Figure 8.9-6).

Table 8.9-15. Average Trail Users by Day of the Week.

Day of Week	Green Creek Diversion Pipeline	Inlet Trail	Little Egypt Climbing Access
Sunday	19.0	1.9	4.8
Monday	6.6	3.9	2.9
Tuesday	7.1	2.4	4.2
Wednesday	7.4	2.3	4.2
Thursday	9.2	2.4	3.1
Friday	10.2	2.2	5.1
Saturday	17.1	4.3	4.4

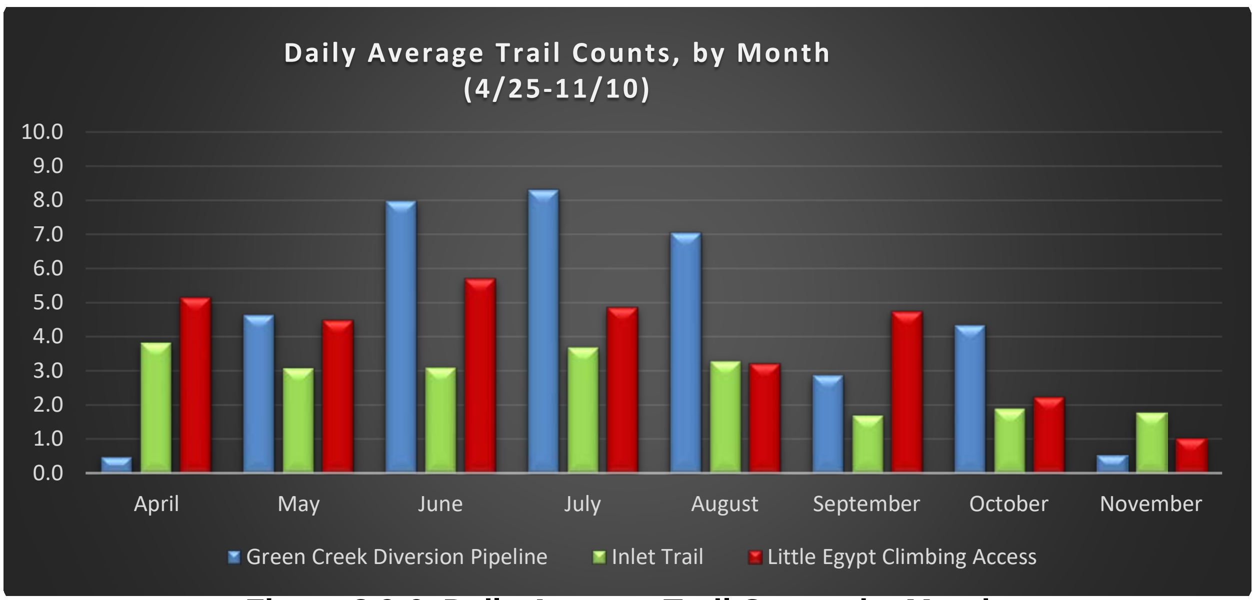

Figure 8.9-6. Daily Average Trail Counts by Month.

8.9.3.7 Spot Counts

Spot counts conducted at the three recreation areas (South Lake, Lake Sabrina, and Intake No. 2), with an attempt to distinguish between general recreators (day users), anglers, and any on-water activities (Table 8.9-16). The number of vehicles and vehicles with trailers were noted for each parking lot at the time of the spot count, which is compared to the total number of parking spots available to estimate capacity utilization at each site in Table 8.9-17.

When comparing spot counts throughout the entire study season, all parking areas are under capacity, although South Lake's upper parking lot, used mostly for overnight parking for wilderness users, averages 88 percent capacity. North Lake Road overnight parking, intended to be used by overnight wilderness users at Lake Sabrina, is far under capacity at an average of 8 percent throughout the study season. When analyzing peak weekend days, four parking areas exceed their capacity, often meaning that recreators are parking in areas not intended for vehicle parking. These four are Lake Sabrina roadside parking (123 percent), South Lake upper parking lot (103 percent), South Lake launching pier/restroom parking lot (119 percent), and South Lake boat launch parking (127 percent).

Table 8.9-16. Spot Count Averages

Location	Observation Site		Vehicle Counts		Trailer Counts		Day User Counts		Angler Counts	
	Sub Area	Description	All	Peak	All	Peak	All	Peak	All	Peak
Intake No. 2	A	Day use parking lot	8.6	16.0	0.0	0.0	n/a	n/a	n/a	n/a
Intake No. 2	B	Lower Intake 2 parking lot	2.8	5.5	0.0	0.0	n/a	n/a	n/a	n/a
Intake No. 2	C	Eastern Shoreline	n/a	n/a	n/a	n/a	n/a	n/a	10.7	19.0
Intake No. 2	D	Northern shoreline	n/a	n/a	n/a	n/a	0.7	2.5	1.4	3.5
Intake No. 2	E	Western shoreline	n/a	n/a	n/a	n/a	n/a	n/a	3.1	11.5
Intake No. 2	G	Intake No. 2 Dam	n/a	n/a	n/a	n/a	n/a	n/a	3.7	9.0
Lake Sabrina	A	Roadside parking	11.9	37.0	0.0	0.0	n/a	n/a	n/a	n/a
Lake Sabrina	B	Lower parking lot	5.1	11.5	0.0	0.0	n/a	n/a	n/a	n/a
Lake Sabrina	C	Upper parking lot	16.5	25.0	0.3	0.5	n/a	n/a	n/a	n/a
Lake Sabrina	D	Shoreline west of dam	n/a	n/a	n/a	n/a	6.3	7.5	10.6	40.0
Lake Sabrina	E	Sabrina Dam	n/a	n/a	n/a	n/a	3.7	6.5	1.8	5.5
Lake Sabrina	F	Creek below Sabrina Dam	n/a	n/a	n/a	n/a	n/a	n/a	1.7	6.5
Lake Sabrina	G	Weir	n/a	n/a	n/a	n/a	1.3	1.0	2.3	10.0
North Lake Road Overnight Parking		Overnight parking for Sabrina TH	5.6	9.0	0.0	0.0	n/a	n/a	n/a	n/a
South Lake	A	Upper parking lot	75.4	89.0	0.1	0.5	n/a	n/a	n/a	n/a

Location	Observation Site		Vehicle Counts		Trailer Counts		Day User Counts		Angler Counts	
	Sub Area	Description	All	Peak	All	Peak	All	Peak	All	Peak
South Lake	B	Launching pier/restroom parking lot	5.8	9.5	0.0	0.0	n/a	n/a	n/a	n/a
South Lake	C	Boat launch parking	7.6	19.0	0.1	0.0	n/a	n/a	n/a	n/a
South Lake	D	Hillside Dam/Spillway	n/a	n/a	n/a	n/a	0.8	5.0	0.5	0.0
South Lake	E	Eastern shoreline/boat ramp	n/a	n/a	n/a	n/a	0.6	1.0	1.1	1.5
South Lake	F	Picnic tables at upper parking lot	n/a	n/a	n/a	n/a	0.2	0.0	n/a	n/a
South Lake	G	Cove near Bishop Pass Trailhead	n/a	n/a	n/a	n/a	1.5	10.5	1.7	3.0
South Lake	H/I	Weir Lake & parking lot	1.8	3.0	0.0	0.0	1.4	3.0	0.5	0.0
Big Trees Campground	A	Along creek	n/a	n/a	n/a	n/a	n/a	n/a	0.5	0.5
Forks Campground	A	Along creek	n/a	n/a	n/a	n/a	n/a	n/a	0.1	0.5
Four Jeffrey Campground	A	Along creek	n/a	n/a	n/a	n/a	n/a	n/a	0.4	2.5

[a]Due to forest closures during Labor Day weekend, spot counts on peak days consisted only of May 29 (Memorial Day Weekend) and July 3 (Independence Day weekend).

Table 8.9-17. Capacity Utilization at Parking Areas

Location	Observation Site		Vehicle Counts		Parking Capacity	Capacity Utilization	
	Sub Area	Description	All	Peak		All	Peak
Intake No. 2	A	Day use parking lot	8.6	16.0	20.0	43%	80%
Intake No. 2	B	Lower Intake 2 parking lot	2.8	5.5	12.0	24%	46%
Lake Sabrina	A	Roadside parking	11.9	37.0	30.0	40%	123%
Lake Sabrina	B	Lower parking lot	5.1	11.5	24.0	21%	48%
Lake Sabrina	C	Upper parking lot	16.5	25.0	36.0	46%	69%
North Lake Road Overnight Parking	n/a	Overnight parking for Sabrina TH	5.6	9.0	70.0	8%	13%
South Lake	A	Upper parking lot	75.4	89.0	86.0	88%	103%

Location	Observation Site		Vehicle Counts		Parking Capacity	Capacity Utilization	
	Sub Area	Description	All	Peak		All	Peak
South Lake	B	Launching pier/restroom parking lot	5.8	9.5	8.0	73%	119%
South Lake	C	Boat launch parking	7.6	19.0	15.0	50%	127%
South Lake	H/I	Weir Lake & parking lot	1.8	3.0	5.0	37%	60%

8.9.3.8 Angler Surveys

Beginning Memorial Day weekend, angler surveys were conducted at the three recreation areas (Lake Sabrina, South Lake, and Intake No. 2) as well as three campgrounds at the request of CDFW (Forks, Four Jeffrey, and Big Trees). The survey found that when surveyed, anglers tend to identify fishing as their primary purpose for visiting the area. As well, most (86.5 percent) indicated they fished in a variety of nearby locations (Table 8.9-18). In general, most fishers visit the area at least annually, and a majority (90.0 percent) come from a California zip code.

Table 8.9-18. Locations Fished by Angler Survey Respondents

Aspendell	Forks Campground	North Lake
Bakers Creek	Four Jeffrey Campground	Owens River
Big Creek	Indian Creek	Pleasant valley Reservoir
Big Pine Lakes	Intake No. 2	Power Plants
Bishop Canals	June Lake	Rock Creek
Bishop Creeks	Kodiak Lake	Rock Lake
Bishop River	Lake Mary	Saunders Pond
Bitterbrush Campground	Lake Sabrina	South Lake
Bridgeport	Lee Vining	Summer Lake
Buckley Lake	Lone Pine Creek	Taboose Creek
Campgrounds	Long Lake	Tahoe
Cardinal Valley	Lower / Upper Hot Creek	Treasure Lake
Convict Lake	Lower Owens	Tuttle Creek
Creeks	Mammoth Lakes	Twin Lake
Crowley	Mosquito flats	Weir Lake

Data from the angler survey indicated that most fish caught in Bishop Creek Project area are 10-inches or smaller and fishing effort tended to range from 0.48 fish per hour in Lake Sabrina to 0.62 fish per hour at the Four Jeffrey Campground (Table 8.9-19).

Table 8.9-19. Estimate of Fish per Effort-Hour

Location	Hours Spent Fishing[a]	Total Fish Caught	Fish Per Effort-Hour
Four Jeffrey	3.25	2	0.62
Big Trees	16.00	9	0.56
Forks [b]	n/a	n/a	n/a
Intake No. 2	316.78	163	0.51
Lake Sabrina	302.10	146	0.48
South Lake	91.25	50	0.55

[a] Time represents self-reported time spent fishing by anglers interviewed. As such, times were reported to be inaccurate (e.g., reporting total time at recreation site rather than time spent only fishing).
[b] No anglers were available for survey during site visits.

8.9.4 Inyo National Forest – National Visitor Use Monitoring Report (FY 2016 Data)

The National Visitor Use Monitoring (NVUM) program under the INF has two goals: 1) to produce estimates of the volume of recreation visitation to national forests and grasslands, and 2) to produce descriptive information about that visitation, including activity participation, demographics, visit duration, measures of satisfaction, and trip spending connected to the visit (USFS, 2018). The most recent visitor use report for the INF was updated on January 21, 2018, and summarizes data collected during fiscal year 2016. The following is a summary of results of that report.

Total visits to the INF[25] in fiscal year 2016 are estimated at 2,309,000 individuals. Many people frequent more than one site during their visit, so estimates are further broken down by site visits, totaling 4,624,000 visits[26]. The most frequented site or area associated with the INF is day use developed (2,608,000 visits), followed by overnight use developed (876,000 visits), general forest area (850,000 visits), and designated wilderness (290,000 visits). Site visits are further broken down by each activity in which the individual participated during that visit. The most common activities selected by survey participants were viewing natural features, hiking/walking, relaxing, downhill skiing, viewing wildlife, and driving for pleasure. The most commonly chosen main activity by survey participants was downhill skiing, followed by hiking/walking, viewing natural features and bicycling. A complete list of activity participation results is provided in Table 8.9-20.

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[25] The 2018 NVUM Report defines a National Forest Visit as the entry of one person upon a national forest to participate in recreation activities for an unspecified time. A national forest visit can be composed of multiple site visits. The visit ends when the person leaves the national forest to spend the night somewhere else.

[26] The 2018 NVUM Report defines a site visit as the entry of one person onto a National Forest site or area to participate in recreation activities for an unspecified period of time. The site visit ends when the person leaves the site or area for the last time on that day.

Demographic data indicates that that 89.3 percent of visitors are White, followed Hispanic/Latino (9.5 percent), Asian (9.1 percent), Black/African American (2.6 percent), American Indian/Alaska Native (2.5 percent), and Hawaiian/Pacific Islander (1.7 percent)[27]. Age distribution estimates 17 percent of visitors are children under the age of 16, and 23 percent are over the age of 60. Most visitors, an estimated 74.4 percent, live more than 200 miles from the forest, and only 18 percent live within a 50-mile proximity.

Table 8.9-20. Activity Participation Results

Activity	Participation (%)	Main Activity (%)
Viewing Natural Features	45.3	8.5
Hiking / Walking	44.2	16.3
Relaxing	34.8	4.6
Downhill Skiing	34.1	32.3
Viewing Wildlife	30.3	0.6
Driving for Pleasure	23.6	1.8
Bicycling	11.9	8.2
Visiting Historic Sites	11.7	0.6
Developed Camping	11.6	3.6
Nature Center Activities	11.2	0.7
Fishing	11	5.8
Picnicking	8.6	0.4
Nature Study	7.8	0.3
Resort Use	7.8	0
Cross-country Skiing	6.8	5.5
Some Other Activity	6.6	4.9
Backpacking	4.9	2.2
Other Non-motorized	3.8	0.3
OHV Use	2.9	0.4
Primitive Camping	2.9	0.2
Motorized Trail Activity	2.7	0.4
Non-motorized Water	2.1	0.5
Gathering Forest Products	1.7	0
Other Motorized Activity	1	0.8
Hunting	0.6	0.5
Horseback Riding	0.6	0.2
Motorized Water Activities	0.4	0.1
No Activity Reported	0.3	0.6

[27] Respondents could choose more than one racial group, so the total may be more than 100%.

Activity	Participation (%)	Main Activity (%)
Snowmobiling	0.3	0

Source: USFS, 2018

8.9.5 2021 California Statewide Comprehensive Outdoor Recreation Plan and Related Reports

According to the California Department of Parks and Recreation (CDPR), the California Statewide Comprehensive Outdoor Recreation Plan (SCORP) "sets grant priorities for outdoor recreation access in California for the next five years" and the 2021-2025 edition "empowers local communities to create, expand, and improve close-to-home parks for all Californians" (CDPR, 2021). While the 2021-2025 California SCORP does not offer specific data regarding current and future recreation needs, it did identify five priorities based on key findings from 37 focus groups who shared their vision for parks and recreation:

- New park access
- Multi-use parks designed for all age groups in new or existing parks
- Health design goals for new or existing parks
- Safety and beautification for new or existing parks
- Preservation (place outdoor open space land under protection for public recreation)

As well as identified four keys to increase healthy park use:

- Provide access to a park
- Consider design
- Offer programs
- Market to the community

The following reports were essential elements used in the 2021-2025 SCORP development that may provide information relevant to the Bishop Creek Project area:

- Vision for Park Equity 2000-2020: Transforming Park Access with Data and Technology (CDPR 2020)
- Designing Parks Using Community-Based Planning – Methods from California's Statewide Park Development and Community Revitalization Program Outdoor Recreation in California's Regions (CDPR 2020)

The following general findings may be important in addressing current and future recreation needs in the Bishop Creek Area (CDPR 2020):

- By number, parks in California are mostly owned by city (9000), special district (1700) and county agencies (1200).
- By acres, parks and open spaces in California are mainly owned by federal (43,700,000) and state agencies (1,990,000).
- Over 61 percent of Californians live in census tracts with less than 3 acres of parkland per 1,000 residents.
- Nearly 8 million people, 21 percent of Californians, have no park within a half mile of their homes.
- Land acquisition and construction prices have increased by approximately $1,500,000 per project site over the past decade from 2010 to 2020.
- Based on current projections, for each $600 million investment, an additional 1 million Californians would have new or expanded park access within a half mile of their neighborhoods.

8.9.6 Land Use and Management of Project Lands

The Bishop Creek Project is situated within the South Fork Bishop Creek (HUC 180901020601), Middle Fork Bishop Creek (HUC 180901020602), Coyote Creek-Bishop Creek (HUC 180901020603), and McGee Creek (HUC 180901020402) sub-watersheds, collectively the Project watershed, predominantly along the Middle and South forks of Bishop Creek as they drain into the Owens Valley. Land ownership within the Bishop Creek Project boundary is predominantly composed of federal lands jointly administered by the INF and BLM; a small portion of INF lands within the Project boundary are managed as a National Wilderness Area (John Muir Wilderness). Approximately 61.1 acres of John Muir Wilderness Area lands are included within the FERC Project boundary for the Bishop Creek Project, and two Project facilities; Longley Lake and an associated flowline, are in the John Muir Wilderness Area.

The remainder of lands in the Bishop Creek Project area are owned by either SCE, the LADWP or private landowners. On April 2, 2010, FERC approved SCE’s revised Exhibit G drawings and associated federal acreage for the Project (FERC, 2010). Table 8.9-21 summarizes land ownership within the current Project boundary based on this approved data.

Table 8.9-21. Land Ownership within the Current Project Boundary

Ownership	Acreage	Percentage of Total
Forest Service	733.8	67.8%
Bureau of Land Management	47.6	4.4%
Non-federal	300.9	27.8%
Total Project Acreage	*1082.2*	

The Bishop Creek Project boundary includes only lands necessary for Project O&M and for the conveyance of water throughout the Bishop Creek system. Based on a review of available data, conversations with SCE staff, and feedback from stakeholders, a list of proposed changes to the current Project boundary has been developed as a result of the Project boundary and Lands (LAND 1). The land use and cover analyses discussed in this section are based on the current Bishop Creek Project boundary.

An analysis of Inyo County tax parcels and each parcel associated with the Inyo County General Plan land use classification shows that the most common underlying land use of Project lands is state and federal lands (77.1 percent), followed by rural protection (18.1 percent) (IC, 2021b).

Table 8.9-22 and Figure 8.9-7Figure 8.9-7 summarize Inyo County land use classifications within the Project boundary. Note that there are discrepancies between Bishop Creek Project and Inyo County tax boundaries that skew the results of land use within the mostly narrow portions of the Bishop Creek Project boundary.

Table 8.9-22. Inyo County Designated Land Use within the Project Boundary

Land Use Label	Land Use Designation	Acreage	Percentage
CR	County Roads	13.8	1.3%
MULTI	Multi-Use	13.7	1.3%
NH	Natural Hazards	7.1	0.7%
NR	Natural Resources	11.6	1.1%
OSR	Open Space and Recreation	0.3	0.0%
REC	Resort/Recreational	1.8	0.2%
RL	Residential Low Density	2.1	0.2%
RP	Rural Protection	195.3	18.1%
RR	Residential Ranch	0.9	0.1%
RVL	Residential Very Low Density	0.4	0.0%
SFL	State and Federal Lands	832.9	77.1%

Source: IC 2021b
Note: Inyo County tax data does not include county road rights-of-way, and this classification was added to show the area in entirety.

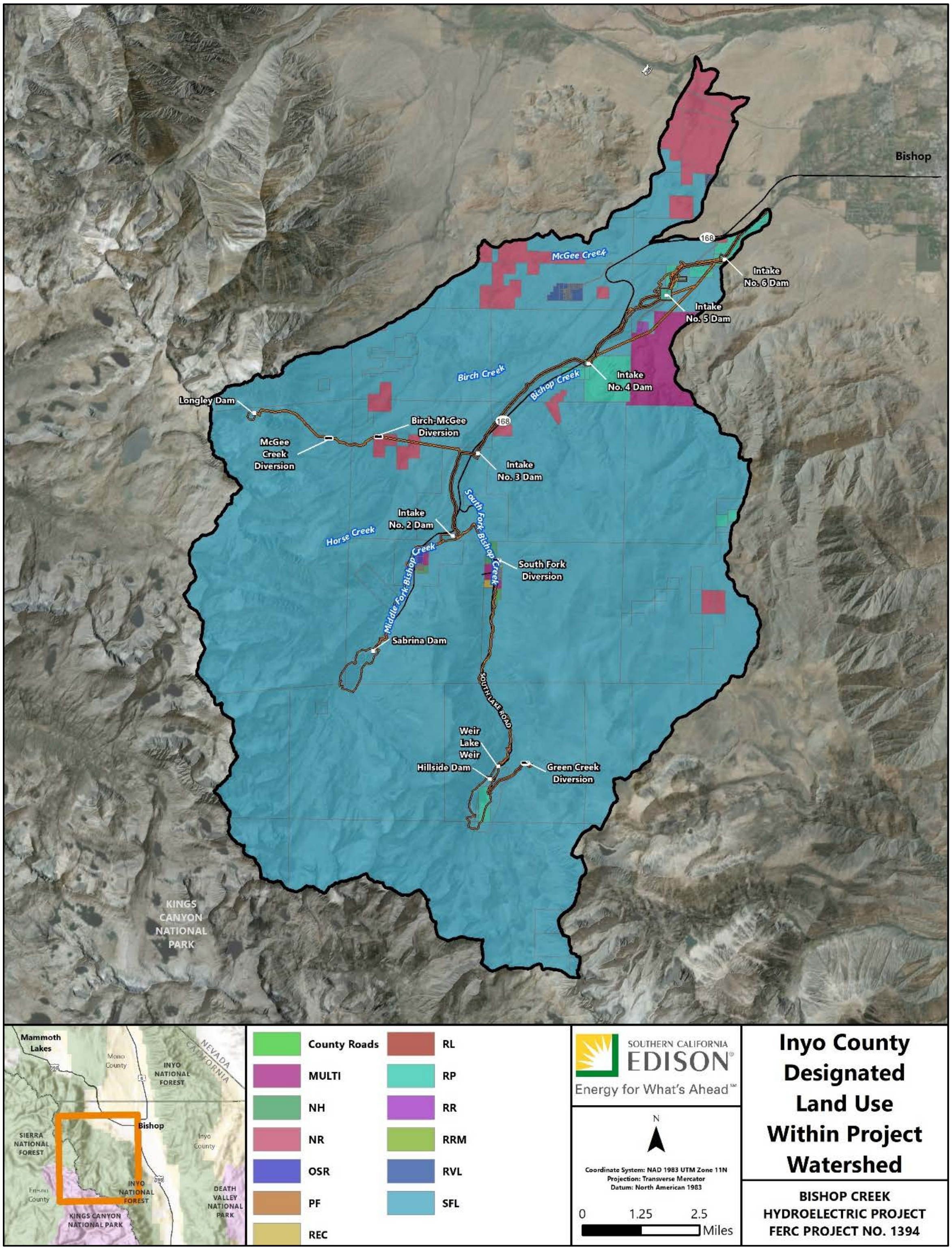

Figure 8.9-7. Inyo County Designated Land Use Within Project Watershed.

An analysis of the Multi-Resolution Land Characteristics Consortium's (MRLCC) 2011 National Land Cover Database (NLCD) provides further information on land use by generalizing land cover within the area (MRLCC, 2014). As summarized in Table 8.9-23, predominant land use within the Bishop Creek Project boundary is shrub/scrub, followed by open water, and evergreen forest (MRLCC, 2014).

Table 8.9-23. NLCD Land Cover within the Project Boundary

GRIDCODE	ACRES	PERCENTAGE	LAND CLASS
11	349.9	32.3%	Open Water
21	30.8	2.8%	Developed, Open Space
22	8.1	0.7%	Developed, Low Intensity
31	14.8	1.4%	Barren Land (Rock/Sand/Clay)
41	5.7	0.5%	Deciduous Forest
42	85.0	7.9%	Evergreen Forest
52	523.0	48.3%	Shrub/Scrub
71	45.5	4.2%	Grassland/Herbaceous
90	19.5	1.8%	Woody Wetlands

Source: MRLCC 2014

Due to the narrow nature of the Bishop Creek Project boundary, a more accurate representation of the land use in the area can be derived by analyzing the Project watershed. The Bishop Creek Project watershed is mostly composed of rural, federally protected lands, resulting in lands that sparsely populated and highly restricted in allowed use (Table 8.9-24). Of the approximately 88,756.5 acres within the Bishop Creek watershed, 92.4 percent of those lands are designated as state and federal lands; the next highest classification is natural resources, followed by rural protection and multi-use (IC, 2021b). The upper Bishop Creek Project watershed is dominated by INF lands, though residents do live in two small residential communities, Aspendell and Mountain View, located in the general vicinity of Intake No. 2 off State Highway 168 and South Lake Road, respectively. The remainder of development in the upper reaches of the Bishop Creek Project watershed are INF campgrounds and recreation use areas.

Table 8.9-24. Inyo County Designated Land Use within the Project Watershed

Land Use Label	Land Use Designation	Acreage	Percentage
CR	County Roads	164.2	0.2%
MULTI	Multi-Use	1,336.4	1.5%
NH	Natural Hazards	115.7	0.1%
NR	Natural Resources	3,478.4	3.9%
OSR	Open Space and Recreation	24.3	0.0%
PF	Public Service Facilities	1.6	0.0%
REC	Resort/Recreational	28.8	0.0%
RL	Residential Low Density	41.7	0.0%
RP	Rural Protection	1,356.7	1.5%
RR	Residential Ranch	38.9	0.0%
RRM	Residential Rural Medium Density	2.5	0.0%
RVL	Residential Very Low Density	191.9	0.2%
SFL	State and Federal Lands	81,975.5	92.4%

Source: IC 2021b

An analysis of the MRLCC's 2011 NLCD on the Bishop Creek Project watershed was conducted to generalize land cover within the area (MRLCC, 2014). As summarized in Table 8.9-25 and Figure 8.9-8 predominant land use within the Bishop Creek Project watershed is shrub/scrub, followed by barren land, and evergreen forest (MRLCC, 2014).

Table 8.9-25. NLCD Land Cover within the Project Watershed

Gridcode	Acres	Percentage	Land Class
11	955.6	1.1%	Open Water
12	329.4	0.4%	Perennial Ice/Snow
21	463.8	0.5%	Developed, Open Space
22	94.3	0.1%	Developed, Low Intensity
23	2.0	0.0%	Developed, Medium Intensity
31	19,558.6	22.0%	Barren Land (Rock/Sand/Clay)
41	490.2	0.6%	Deciduous Forest
42	15,380.4	17.3%	Evergreen Forest
43	43.6	0.0%	Mixed Forest
52	43,526.1	49.0%	Shrub/Scrub
71	7,449.0	8.4%	Grassland/Herbaceous
81	101.4	0.1%	Pasture/Hay
82	47.6	0.1%	Cultivated Crops
90	324.0	0.4%	Woody Wetlands
95	64.2	0.1%	Emergent Herbaceous Wetlands

Source: MRLCC 2014

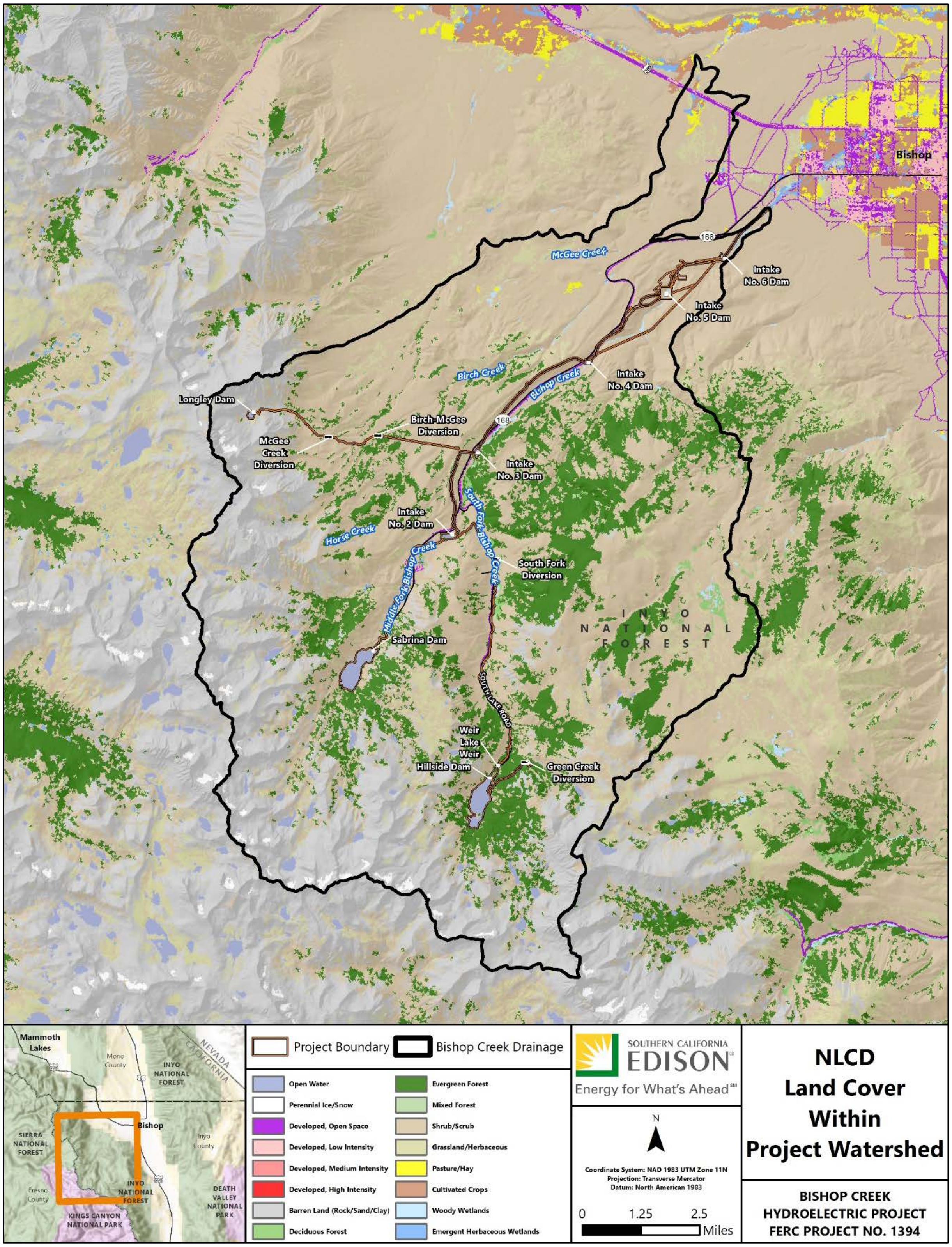

Figure 8.9-8. NLCD Land Cover Within Project Watershed.

8.9.7 Potential Adverse Effects and Issues

The following sections address potential effects as identified by the TSP and SD1 (Table 8.1-1). Based on the completed studies, and reviews of existing literature, SCE has identified no adverse effects based on the Proposed Action.

8.9.7.1 Potential Impacts on Recreation Facilities Condition and Public Accessibility

The goals of the Recreation Facilities Condition and Public Accessibility Study (REC 2) were to assess the condition of and accessibility to existing recreation facilities at the Bishop Creek Project and the need to formalize or reclaim/manage (due to environmental concerns) dispersed or informal use areas, namely those in conflict with current INF or wilderness restrictions. Project-related recreation facilities were considered all facilities related to the South Lake, Lake Sabrina, and Intake No. 2 Reservoir recreation areas, regardless of ownership or management. Dispersed use assessments were generally conducted at all developed facilities, reservoir shorelines, and islands within each reservoir. SCE is working with the USFS to obtain additional information, including the operation and maintenance cost of toilet pumping, cleaning, dumpsters, patrol, maintenance, OHV route maintenance, trail maintenance, wilderness ranger patrol, LEO, and engineering, which is necessary to meet the intent of the study plan. Detailed methods and results of the study are available in Volume 3 of this DLA.

While additional data on historic O&M expenses are still being compiled, a summary of notable findings is provided in Table 8.9-26Table 8.9-26. After the filing of the DLA, SCE intends to continue discussions with USFS surrounding the nexus between recreation facilities, Project facilities, and operations. It is anticipated that an updated analysis of potential impacts on recreation facilities condition and public accessibility will be provided in the FLA. Proposed measures were not addressed in the REC 2 study but will be discussed and developed in the FLA.

The results of the facilities assessment will inform the potential for new recreation opportunities, new site development, or modification of existing recreation resources to address future recreation needs in the Bishop Creek Project area, consistent with the Desired Conditions described in the INF Land Management Plan (USDA, 2019). The degree to which these potential modifications and enhancements (including dispersed use areas) are to be part of the Proposed Action for the new license will rely, in part, on the results of the REC 1 study results.

Table 8.9-26. Summary of Notable Findings for the Facilities Condition Assessment

Category	Lake Sabrina	South Lake	Intake No. 2
Roads and Parking	The majority of the paved surfaces were found to be in fair condition, with frequent cracks, areas of alligator cracking, eroding edges and occasional potholes. Both paved parking lots need re-striping and a minimum of two ADA accessible (with at least one van accessible) Parking stalls in Parking Lot A should be designed and designated. Day Use Parking Areas (earthen pull-offs described as Areas A - G) are all generally in need of maintenance.	All access roads and parking have been re-paved and striped since the completion of this field work and should be in good condition.	The roads and parking facilities assessed at Intake No. 2 consist of asphalt paved access drives and earthen/gravel paved parking and access. Asphalt paved surfacing has been repaired numerous times with crack sealers and patches. The edges of the asphalt paved surfaces are eroded and irregular. An entire asphalt overlay should be considered when economically feasible. The earthen/gravel paved surfaces for the access road and parking areas are in good condition overall, however transitions between the asphalt and earthen/gravel paving that should be addressed.
Site Elements	The movable, floating boat docks were in use but were not on an accessible route and, by nature of design, do not meet ADA accessibility compliance. The boat launch ramp was observed in use and was operable; however, the boat launch facility as designed does not provide ADA accessibility. The fish cleaning station was not operable and should be replaced with a facility meeting ADA accessibility criteria and relocated to an area with an accessible route. The portable boat slips/docks, fixed gangways, fish cleaning station, trash and recycling receptacles, and marina	The movable floating boat docks were in use but were not on an accessible route and by nature of design do not meet ADA accessibility compliance. The boat launch facility, as designed, does not provide ADA accessibility. The picnic tables, stairs to launching pier, boat ramp vehicular access gate, and vehicular access gate at the trailhead were noted as either needing repairs or replacement.	BBQ grills were not located along accessible routes. Water hydrant was inoperable and was not ADA accessible. The fishing pier guardrail/handrail and picnic tables were noted as either needing repairs or replacement.

Category	Lake Sabrina	South Lake	Intake No. 2
	guardrails/handrails were noted as either needing repairs or replacement.		
Site Buildings	Buildings were noted as being in good condition.	The Parking Lot C restroom is somewhat dated and based on the ADA assessment, has deficiencies that should be addressed. The interior is in poor condition and needs repairs and maintenance upgrades. The South Lake Landing building was reviewed based on visual assessment of the exterior only. The roof appears to be at the end or near end of lifespan and should be replaced soon. The ramp that accesses the deck is structurally in good condition; however, the transition from earthen path to the ramp should be modified to accommodate ADA accessibility.	Buildings were noted as being in good condition.
Signage and Wayfinding	Current sign design standards should be reviewed for ADA compliance (letter sizes, contrast, color, height). Several of the parking signs observed are mounted very low to the ground and are in conflict with some surrounding plant material. Regulatory signs that have been modified should be replaced. Some signs have had text added to them using non-reflective material that is not be visible at night. The Lake Sabrina Launch Facility sign requires re-painting and maintenance.	Review current sign design standards for ADA compliance (letter sizes, contrast, color, contrast, height). Standardize the sign mounting system and materials used for the various informational signs to add continuity to the overall signage system. Some are mounted on round timbers, others on square posts, others on galvanized pipe frame systems. Consolidate the placement of signs to reduce clutter and improve the aesthetic quality of the facility.	Review current sign design standards for ADA compliance (letter sizes, contrast, color, contrast, height). Regulatory signs that have been modified should be replaced. Some signs have had text added to them using non-reflective material that would not be visible at night. Standardize the sign mounting systems and materials used for the various informational signs to help add continuity to the overall signage system. Some are mounted on round timbers, others on square posts, others on galvanized pipe frame systems.

Category	Lake Sabrina	South Lake	Intake No. 2
	Standardize the sign mounting systems and materials used for the various informational signs for continuity to the overall signage system. Signs are mounted on round timbers, others on square posts, others on galvanized pipe frame systems. This would simplify maintenance and replacement efforts in the long term. Consolidate the placement of signs to reduce clutter and improve the aesthetic quality of the facility.		This will also simplify maintenance and replacement efforts in the long term. Consolidate the placement of signs to reduce clutter and improve the aesthetic quality of the facility.
Visual and Aesthetic Quality	Upgrade signage system to standardized graphics, mounting structures, and general placement and organization. Upgrade, replace, and/or organize site furnishings such as recycling and trash receptacles, dumpsters, and fish cleaning station. Add plantings for buffering, screening, and enhancement.	Upgrade signage system to standardized graphics, mounting structures, and general placement and organization. Upgrade, replace, and/or organize site furnishings such as recycling and trash receptacles, dumpsters, and food lockers. Add plantings for buffering, screening, and enhancement.	Upgrade signage system to standardized graphics, mounting structures, and general placement and organization. Upgrades, replace, and/or organize site furnishings such as recycling and trash receptacles, dumpsters, and food lockers. Add plantings for buffering, screening, and enhancement.
Universal Accessibility	The most significant non-compliance issues consist of a lack of accessible routes to the following amenities: lake shoreline / beach access, boat launch, boat docks, recycling / trash receptacles, viewing areas/overlook at dam, fish cleaning station, trailheads/trails, and ADA accessible parking (no designated spaces). Modify other site amenities to make them ADA compliant, including: fish cleaning station, recycling / trash receptacles, ADA	The most significant non-compliance issues consist of a lack of accessible routes to the following amenities: lake shoreline / beach access, south lake landing building, boat launch, boat docks, recycling / trash receptacles, picnic tables, and trailheads/trails.	The most significant non-compliance issues consist of a lack of accessible routes to the following amenities: lake shoreline / beach access, picnic areas, recycling / trash receptacles, water hydrant, fee deposit post, restrooms, and fishing piers.

Category	Lake Sabrina	South Lake	Intake No. 2
	parking spaces and signage, and tactile signage at the restroom.		
Public Safety Measures	The pathway along the crest of the dam has very steep slopes on both edges of the pathway. The lake side of the pathway is protected by a continuous guardrail system. The opposite edge of the pathway is currently unprotected, a new edge treatment should be considered (railing, cable fence, curb rail, plantings, boulders or other) to reduce the public risk. The accessible route from the Marina Parking Lot A to various site amenities is shared use with the access drive and parking lot drive aisles. Future considerations to reduce potential for pedestrian and vehicular conflicts should be considered, including strategic striping at crossings, detectable warning pavement (truncated domes), and/or separated pedestrian access routes. Repair eroded edges and sections of pathways, roadways and parking areas to alleviate tripping hazards and potential damage to vehicles.	The stairs to the launching pier are in poor condition and pose safety hazards. The stairs should be rebuilt with a handrail. Repair eroded edges and sections of pathways and paved surfaces to alleviate tripping hazards and potential damage to vehicles.	The accessible route from parking lots A and B to various site amenities is shared use with the access drive and parking lot drive aisles. Future considerations to reduce potential for pedestrian and vehicular conflicts should be considered, including strategic striping at crossings, detectable warning pavement (truncated domes), and/or separated pedestrian access routes. Repair eroded edges and sections of pathways and paved surfaces to alleviate tripping hazards and potential damage to vehicles.
Dispersed Use	Observations resulted in an estimate of 47 potential campsites; 6 fire pits; 2.0 miles of user created trails; 20 visibly evident bank access points; and 1.3 miles of shoreline used for bank fishing or general recreation. Notable observations include:	Observations resulted in an estimate of 82 potential campsites; 20 fire pits; 1.9 miles of user created trails; and 1.0 miles of shoreline used for bank fishing or general recreation. Notable observations include:	Observations resulted in an estimate of 5 potential campsites; 1.0 miles of user created trails; 61 visibly evident bank access points; and 0.7 miles of shoreline used for bank fishing or general recreation. Notable observations include:

Category	Lake Sabrina	South Lake	Intake No. 2
	• Heavy access for bank fishing to the impounded water upstream of the weir and below the dam and along the Inlet Trail. • A user-created trail (Inlet Trail) that extends from the marina to the Middle Fork Bishop Creek Inlet. Portions of the trail pass through the John Muir Wilderness. • Heavy day use and evidence of overnight camping at the peninsula on the western shores and near the center of the lake. • Heavy day use and evidence of overnight camping at the south end of the lake, near the inlet. Activities are within the John Muir Wilderness.	• Apparent use of the Green Creek Diversion pipeline as a hiking trail rather than the USFS Baker Summit Trail located further north to access wilderness areas to the east. A trail counter was installed along the pipeline as part of the ongoing REC 1 study. • Evidence of overnight camping along the ridges above the main recreation area. • Heavy day use and evidence of overnight camping at various locations at the south end of the lake, including the island. Many of these locations are within the John Muir Wilderness.	• Heavy day use and bank access for fishing along most of the shoreline. • Heavy day use and potential overnight camping along Middle Fork Bishop Creek before it enters Intake No. 2 Reservoir.

8.9.7.2 Evaluation of Current Recreational Use and Future Recreation Needs for the Project

Based on results of the Recreation Use and Needs Assessment (REC 1) and the Facilities Condition Assessment (REC 2), facilities around the reservoirs are generally in average condition: most site elements at the reservoirs appear to be in working condition but in need of maintenance, repair, or upgrade. Day use facilities at reservoirs are perceived to be crowded, and there may be a need for improvements to trailer parking and fish cleaning facilities.

General parking can be an issue throughout the study area. According to spot counts conducted throughout the entire study season, all parking areas are under capacity except South Lake's upper parking lot, which is reserved mostly for overnight parking for wilderness users. On peak weekend days, however, four parking areas exceed capacity, and this can drive recreators to park in areas not intended for parking. Wilderness hiking access and parking is a confounding factor when hikers utilize parking areas at the reservoirs (Lake Sabrina and South Lake) rather than those at the designated trailheads. The REC 1 report summarizes data from California Department of Finance's Demographic Research Unit (CDF, 2021) that indicate potential growth of 8.3 percent in California's population over the life of a new FERC license, although Inyo County's population is projected to decline by 10.8 percent and Los Angeles County could decline by as much as 5.5 percent. As these two areas contribute significantly to the recreational demand at the Bishop Creek Project area (Draft Technical Report, Volume 3), it is possible that area visitation may reach a steady-state.

Informal use of certain trails – Green Creek Diversion Pipeline, Inlet Trail, and access to Little Egypt climbing area – is commonplace and may warrant action to either preclude or formalize the use, depending on management objectives.

After the filing of the DLA, SCE intends to continue discussions with USFS surrounding the nexus between recreation facilities, Bishop Creek Project Facilities, and Operations. It is anticipated that an updated analysis of current recreational use and future recreation needs will be provided in the FLA.

8.9.7.3 Evaluation of the Accuracy of the Current Project Boundary and Whether Lands should be Added to or Removed from the Project Boundary

Pursuant to 18 CFR § 4.41, the Bishop Creek Project boundary must encompass all lands necessary for Project O&M purposes over the term of the FERC license. SCE has reviewed the existing FERC boundary and identified locations where lands should be added or removed from the Project boundary. Results of SCE's review are summarized in the Project boundary and Lands (LAND 1) technical memo, included in Volume 3 of this DLA. Table 8.9-27 summarizes those proposed changes tied to Operations and Facilities. Changes that are specifically related to Bishop Creek Project roads and trails are identified in Table 8.9-28 and Table 8.9-29, respectively.

In addition to the changes described below, the LAND 1 study identified mapping errors from the existing license where modern spatial information tools provide a more accurate reflection of the intended boundary. These corrections include the following:

- Areas where the natural channel acts as a flow-line and previous metes-and bounds descriptions do not adequately encompass the flowline or provide a buffer; SCE proposes to redraw the boundary along the centerline of these areas. Notable areas where this correction will be applied include South Fork of Bishop Creek, Middle Fork of Bishop Creek, and McGee Creek between Longley Lake and the diversion.

- Apparent mapping incongruities where the John Muir Wilderness and the FERC boundary where both boundaries appear to attempt to represent the same boundary, such as the contour or the maximum operating level of a reservoir or the banks of a creek. SCE will work with the USFS to align the spatial data so as to remove these overlapping areas.

Table 8.9-27. Proposed Boundary Changes Related to Operations/Facilities

ID*	Description	Proposed Action	Reason for Proposed Boundary Change
Operations/ Facilities – 1	Lands adjacent to Intake No. 6 are currently used for spoils/staging and are not included in the Project boundary.	Add lands to the boundary. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands currently in use by Project Operations
Operations/ Facilities – 2	The current Project boundary does not fully encompass all facilities associated with Plant 4 on USFS lands.	Obtain approval from USFS and add lands to the boundary.	Addition of Project lands (Project operations)
Operations/ Facilities – 3	The current Project boundary does not fully encompass all lands used for spoils in the "donut" between access roads and buffers to penstocks on USFS lands.	Obtain approval from USFS and add lands to the boundary.	Addition of Project lands (Project operations)
Operations/ Facilities - 4	USFS lands adjacent to Flowline 3 are currently used a for spoils/staging and are not included in the Project boundary.	Obtain approval from USFS and add lands to the boundary.	Addition of Project lands (Project operations)

*Corresponding location can be found in Appendix A of the LANDS 1 Memorandum (Volume 3).

Table 8.9-28. Proposed Boundary Changes Related to Project Roads and / or to the Project Roads Inventory

ID*	Description	Proposed Action	Reason for Proposed Boundary Change
Road - 1	An access road use to the north side of Plant 5 is not currently within the Project boundary or listed as an official Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)
Road - 2	An access road to the southeastern end of Intake No. 6 is not currently within the Project boundary or listed as an official Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)
Road - 3	A USFS road providing access to the cell phone repeater is not currently within the Project boundary.	Obtain approval from USFS and add road buffer to the boundary.	Addition of Project lands (Project roads)
Road - 4	An access road providing access along Power Plant No. 4 Penstocks is mostly within the Project boundary	Add to Project boundary and Project roads inventory. This addition encompasses	Addition of Project lands (Project roads)

ID*	Description	Proposed Action	Reason for Proposed Boundary Change
	but not fully encompassed. The road is also not listed as an official Project road.	lands currently owned by SCE and would not require additional landowner approvals.	
Road - 5	An access road to the weir below Intake No. 4 is currently mostly within the Project boundary but not officially listed as a Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)
Road - 6	An access road providing access to the south end of Intake No. 4 is partially within the Project boundary but not fully encompassed. It is also not listed as an official Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)
Road - 7	An access road to the western end of Plant No. 3 facilities is not currently within the Project boundary or listed as an official Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)
Road - 8	An access road from Buttermilk Road to Birch-McGee Diversion is partially within the Project boundary but not fully encompassed. It is also not listed as an official Project road and is located on land owned by LADWP.	Consult with LADWP and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road - 9	An access road to the Project gage below McGee Creek Diversion Flowline is partially within the Project boundary but not fully encompassed. It is also not listed as an official Project road and is on land owned by USFS.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road - 10	A road on USFS lands providing access from Big Trees Road to Flowline 3 is not currently within the Project boundary.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road - 11	A portion of Buttermilk Road on USFS lands is used for access to Birch Creek Diversion Flowline but is not within the Project boundary.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)

ID*	Description	Proposed Action	Reason for Proposed Boundary Change
Road - 12	An access road to the south side of Plant No. 2 is partially within the Project boundary but not fully encompassed. It is not listed as an official Project road and partially located on USFS land.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road - 13	An access road to the Project gage at the end of Birch Creek Diversion Flowline is partially within the Project boundary but not fully encompassed. It is not listed as an official Project road and is located on USFS land.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road – 14	An access road from Buttermilk Road to Flowline 2 is partially within the Project boundary but not fully encompassed. It is not listed as an official Project road and is partially located on USFS land.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road – 15	An access road from Flowline 2 to the downstream end of Intake No. 2 is currently partially within the Project boundary and not officially listed as a Project road and is partially located on USFS land.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road – 16	An access road south of Intake No. 2 Reservoir leading to the south end of the diversion is currently partially within the Project boundary and not officially listed as a Project road and is partially located on USFS land.	Consult with USFS and add to Project boundary and Project roads inventory.	Addition of Project lands (Project roads)
Road – 17	An access road to the South Fork Diversion is not currently fully encompassed within the Project boundary and not listed as an official Project road.	Add to Project boundary and Project roads inventory. This addition encompasses lands currently owned by SCE and would not require additional landowner approvals.	Addition of Project lands (Project roads)

*Corresponding location can be found in Appendix A of the LANDS 1 Memorandum (Volume 3).

Table 8.9-29. Proposed Boundary Changes Related to Project Trails

ID*	Description	Proposed Action	Reason for Proposed Boundary Change
Trail - 1	SCE has discussed that this portion of the Sabrina Basin Trail - a USFS system trail – should be included in the Bishop Creek Project boundary and listed as a Project trail to facilitate access for maintenance to the Sabrina Dam spillway. This is on USFS property.	Consult with USFS and add to Project boundary and Project trails inventory.	Addition of Project lands (Project trails)

*Corresponding location can be found in Appendix A of the LANDS 1 Memorandum (Volume 3).

8.9.7.4 FERC Boundary Acreage Change

Based on results of the LAND 1 study, proposed boundary modifications described above would result in the land ownership within the FERC boundary shown in Table 8.9-30Table . Land ownership of all parcels will be verified for the FLA, after discussion with the appropriate agencies.

Table 8.9-30. Land Ownership within Project Boundary

Ownership	Acreage	Percentage of Total	Change From Existing (Acres)
U.S. Forest Service	758.5	71.2	24.7
Bureau of Land Management	47.6	4.5	0
Non-federal	255.8	24.0	-45.0
Total Project Acreage	**1063.9**	**n/a**	**-17.0**

8.9.8 Consistency with Inyo National Forest Land Management Plan

SCE has reviewed the desired conditions in the Inyo National Forest Land Management Plan (USDA, 2019) to assess whether the Bishop Creek Project is consistent with stated management objectives. The following desired conditions relating to recreation and land use, with which the Project is consistent, include:

- WTR-FW-DC 05: Infrastructure (administrative sites, recreation facilities, and roads) has minimal adverse effects to riparian and aquatic resources
- SPEC-SHP-STD 02: Manage recreation, or other disturbances, where research has found it to cause Sierra Nevada bighorn sheep to avoid important habitat as described in the Sierra Nevada Bighorn Sheep Recovery Plan or other guidance from the U.S. Fish and Wildlife Service.
- REC-FW-DC 02: The condition, function, and accessibility of recreation facilities accommodates diverse cultures with appropriate activities available to the public
- REC-FW-DC 03: Recreation opportunities provide a high level of visitor satisfaction. The range of recreation activities contribute to social and economic sustainability of local communities.
- REC-FW-DC-05: Visitors can connect with nature, culture, and history through a range of sustainable outdoor recreation opportunities
- REC-FW-DC-06: The management and operation of facilities are place based, integrated, and responsive to changes that may limit or alter access
- REC-FW-DC-07: New developed recreation infrastructure is located in ecologically resilient landscapes, while being financially sustainable, and responsive to public needs.

- REC-FW-DC-08: Summer dispersed recreation occurs in areas outside of high visitation, developed facilities, or communities, and does not adversely impact natural or cultural resources

- MA-GRA-DC 03: Places for people seeking natural scenery and solitude are available in some areas. In other areas, motorized and nonmotorized recreation opportunities are easily accessed by roads, and visitors can expect encounters with others.

8.9.9 Proposed Mitigation and Enhancement Measures

Following the filing of the DLA, SCE intends to continue meeting with the USFS and the Recreation TWG to finalize the Bishop Creek Project Recreation Facilities and any Project boundary changes. These facilities, including roads and trails, along with their management will be included in a Recreation Resources Management Plan (PME-8, Appendix A) to be filed with the FLA. Additionally, a final Exhibit G will be filed with the FLA to reflect changes to the FERC Project boundary.

8.9.10 References

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8.10 AESTHETIC RESOURCES

This section describes aesthetic resources that occur in the Bishop Creek Project area. The discussion is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform the understanding of the Bishop Creek Project effects.

For purposes of this resource, the Bishop Creek Project area is defined as the FERC Project boundary. No new construction is proposed for the Bishop Creek Project and noises associated with Project operations would remain largely the same, therefore no noise/auditory effects analysis has been completed for this DLA. Additionally, FERC did not identify potential resource issues relating to aesthetics in SD1, nor were issues identified in the early consultation with stakeholders. Photos of Bishop Creek Project facilities are provided immediately following the discussion.

8.10.1 OVERVIEW

The Bishop Creek Project is located in the Owens Valley in areas of the eastern Sierra Nevada in Inyo County, southwest of the City of Bishop, California. The Bishop Creek Project facilities are sited along Bishop Creek and its tributaries including South Fork, Middle Fork, Green Creek, Birch Creek, and McGee Creek. Bishop Creek is a tributary to the Owens River (Figure 8.1-1). The Bishop Creek Project vicinity includes lands within the INF, the John Muir Wilderness, lands managed by the BLM, and private lands.

8.10.2 NEARBY SCENIC ATTRACTIONS

Within and adjacent to the Bishop Creek Project boundary are federal lands, including INF lands, a small part of which is the John Muir Wilderness, a National Wilderness Area. Visitors come to these areas largely for their scenic value, and this tourism helps support the local economy.

The Land Management Plan for the INF (USDA, 2019) addresses plans to improve the scenic integrity of the forest. The INF includes several scenic attractions, including Mt. Whitney, Mono Lake, Reds Meadow, Mammoth Lakes, and the Ancient Bristlecone Pine Forest (https://www.fs.usda.gov/inyo). Three Wild and Scenic Rivers are partially within portions of the INF but outside of the Bishop Creek Project boundary: the north and south forks of the Kern Wild and Scenic River, Cottonwood Creek Wild and Scenic River, and the Owens River Headwaters Wild and Scenic River (IWSRCC, 2021). The INF is comprised of over 1,000 miles of the Pacific Crest Trail (PCT), a trail known for its scenic value and much of which is in designated wilderness.

Within the Bishop Creek Project vicinity, there are multiple nationally and state designated scenic trails and byways. The PCT, which traverses the western side of the Sierra Nevada crest in the Kings Canyon National Park and Sequoia-Kings Canyon Wilderness, offers outstanding scenic vistas and panoramic views. The PCT extends approximately 2650 miles from the Canadian border through Washington, Oregon, and California until reaching the border of Mexico. The PCT is one of 11 national scenic trails and is considered one of the most remote, long-distance trails with over 54 percent of its path in designated wilderness (USFS 2018). In the John Muir and Ansel Adams Wilderness Areas, PCT visitors experience stunning vistas of glaciated landscapes, including sparkling blue lakes with a backdrop of high, rocky peaks on the Sierra Crest.

Approximately 15 miles south of Bishop, in Big Pine, California, is the beginning of the Ancient Bristlecone Scenic Byway that follows California State Route 168 and Forest Service Road 4S01 (White Mountain Road) from Owens Valley at 4,000 feet in elevation approximately 34 miles into the White Mountains to Patriarch Grove at 11,200 feet in elevation. The byway climbs through pinyon-juniper woodlands to the world's oldest living trees located in the Ancient Bristlecone Pine Forest. The route was designated a National Forest Scenic Byway July 13, 1992 and is eligible for State Scenic Highway Designation but has not yet been granted (SNGT 2021).

Running north-south along the eastern Sierra Nevada, sections of U.S. Route 395 have been designated a California Scenic Highway. The route extends 557 miles from northern Los Angeles to the Oregon border along the eastern range of the Sierra Nevada and Cascade mountain ranges, passing through Bishop and a host of breathtaking views of America’s tallest mountains.

8.10.3 Visual Character of Project Vicinity

The visual character of the Bishop Creek Project vicinity is diverse and representative of the three major biological provinces within the area: Sierra Nevada, Great Basin and the Mojave Desert. Elevations ranging from 3,900 feet to 14,494 feet shape the scenic character of the area and extreme topographic relief of up to 10,000-feet vertical gradients can be found along the Sierra Nevada, White and Inyo mountains. Opportunities for scenic overlooks are found throughout the area and allow visitors to experience the large expanses of undeveloped land; rare geologic formations like the Mono Craters and Obsidian Dome; wilderness areas such as the Ansel Adams and John Muir Wildernesses; and diverse ecosystems from alpine, mixed-conifer, Jeffrey pine, sagebrush steppe, to desert. Some of the most outstanding visual attractions include Mono Lake with geologic formations like tufa, and Mount Whitney, the highest peak in the continental United States at 14,494 feet in elevation (USFS 2018).

The most common developments on the INF that alter scenic integrity include powerlines, communication sites, substations, propane tanks, geothermal development, ski areas, hydropower facilities, reservoirs, recreation facilities, resorts, and temporary conditions such as dust and smoke (USFS 2018).

8.10.4 Visual Character of Project Lands

The Bishop Creek Project is situated in the foothills and mountainous uplands of the eastern slope of the southern Sierra Nevada. Lake Sabrina (9,100-feet msl), South Lake (9,800-feet msl), and Longley Lake (10,708-feet msl) are located in the high, steep, rocky and rugged mountain valleys, typical of the eastern slopes of the Sierra Nevada. As Bishop Creek Project creeks flow from each reservoir, the valleys gradually transition into the wide-open landscape of the Owens Valley. A wide ribbon of trees next to the streams contrast with the surrounding drier, grass and shrub covered valley slopes.

The Bishop Creek Project facilities were built early last century; the architecture of the power plant is consistent with the period and with Spanish influences and is well within the landscape (FERC 1994). The linear flowlines have been largely replaced during the current license term and measures have been taken to blend these features into the landscape by matching colors and avoiding ridgeline placement. During the current license term, an existing 55-kV line was buried and relocated to reduce its visual impact.

Because Bishop Creek Project streams are accessible and visited by many recreationists, the visual quality of the streamflow was studied in the previous relicensing. SCE conducted studies of flows needed to enhance the visual quality of and other sensory values. Minimum instream slows established in the existing license have resulted in enhancements of visual quality over historic time-periods.

Photo 8.10-1. Lake Sabrina.

Bishop Creek Project facilities are easily accessible by Highway 168 and South Lake Road, both of which are public roads used heavily by recreationists year-round. These roads generally parallel the Middle and South forks of Bishop Creek, respectively, providing ample opportunity for viewing the Bishop Creek Project area and its associated facilities along those water sources. Bishop Creek Project facilities were originally built in the early twentieth century with architecture that blends well with the landscape (FERC 1991). The linear flowlines and transmission lines are more obvious, though vegetation growth over the past century within rights-of-way has reduced any potential impact of visual contrast (FERC, 1991).

Photo 8.10-2. Plant 6.

The majority of land within and surrounding the Bishop Creek Project is managed by the INF and subject to the desired conditions set forth in its Land Management Plan for the INF (USDA, 2019). A small portion of Bishop Creek Project lands are managed by BLM and surrounding lands are subject to the standards and goals of the 1993 Resource Plan (BLM, 1993). The remainder of lands within the Project area are owned by SCE, LADWP or private landowners, and are subject to the standards and goals set in Inyo County's 2001 Plan[28] (IC, 2001).

Additional photographs below provide a representative view of major Bishop Creek Project facilities and surrounding landscapes.

8.10.5 POTENTIAL ADVERSE EFFECTS AND ISSUES

Project effects on visual and aesthetic resources were not identified by FERC in SD1 or in early outreach with the TWGs, and therefore did not have a specific study for

[28] Inyo County is currently working on an updated plan.

determining effects. Measures from the last license to address visual resources, including minimum instream flows, will be continued in the new license. Under the Proposed Action, there are no changes to facilities or operations aside from PME measures; therefore, SCE believes that their potential adverse effects on this resource.

8.10.5.1 Consistency with the Inyo National Forest Land Management Plan

SCE has reviewed the desired conditions in the INF Land Management Plan to assess whether the Bishop Creek Project is consistent with management objectives. The following desired conditions relating to aesthetic resources, with which the Bishop Creek Project is consistent, include:

- SCEN-FW-DC 02: Scenic character is maintained and/or adapted to changing conditions to support ecological, social, and economic sustainability on the Inyo [National Forest] and in surrounding communities.
- SCEN-FW-DC 03: In places with distinctive scenic attractiveness[29] and in "special places"[30], scenic integrity is maintained or improved to assure high quality viewing experiences. The INF's scenic resources complement the recreation settings and experiences, as described by the range of scenery integrity objectives, while reflecting healthy and sustainable ecosystem conditions.
- MA-GRA-DC 02: Scenic integrity [in general recreation areas] is generally moderate to high. Where developed facilities are present, they are aesthetically incorporated into the landscape. Scenic integrity is maintained.

8.10.6 Proposed Mitigation and Enhancement Measures

No new development or changes are proposed in Bishop Creek Project O&M activities; therefore, no significant impacts to aesthetic resources in the Bishop Creek Project area are expected. Existing measures for Bishop Creek Project lands which are owned and managed by the USFS and BLM are subject to the respective federal land management plans, and non-federally owned lands are subject to the Inyo County Plan.

[29] Distinctive scenic attractiveness (or Class A) is defined in, Landscape Aesthetics: A Handbook for Scenery Management (USDA, 1995), as "Areas where landform, vegetation patterns, water characteristics, and cultural features combine to provide usual, unique, or outstanding scenic quality. These landscapes have strong positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern and balance.

[30] "special places" are defined in Landscape Aesthetics: A Handbook for Scenery Management (USDA, 1995), as "locations in the landscape with unique importance and meaning. At times, special places are isolated, small areas or spots; at other times, they are large areas of land. Special places often have "place names" indicating local or regional significance. Special places may be merited strictly because of scenic attributes."

The USFS, as authorized under Section 4(e) of the FPA, requested the following conditions for the Bishop Creek Project during the last relicensing effort, which FERC approved: SCE to provide the USFS with funds for the construction, operation, and maintenance of two access trails; to carry out measures to enhance recreation and protect visual resources and wildlife; and to provide minimum flows to enhance visual quality. The minimum flows required under the current license are intended to enhance the visual quality of bypass reaches by providing water year-round to previously summer-dry reaches and increasing flow during months of high recreation use. This increased flow has also increased riparian vegetation and habitat as discussed in Section 8.7, adding to increased visual quality. Additionally, under the existing license SCE is required to consult with the USFS before starting any land disturbing activities. Article 104 requires that each year during the 60 days preceding the anniversary date of the license, the licensee shall consult with the USFS with regard to measures needed to ensure protection and development of the natural resource values of the Bishop Creek Project area (FERC, 1994).

Under the Proposed Action, SCE anticipates continued adherence to federal land management plans, the Inyo County Plan, and all relevant license articles.

Photo 8.10-3. Plant 6 Downstream.

Photo 8.10-4. Plant 5/Intake No. 6.

Photo 8.10-5. Plant 5 Facilities

Photo 8.10-6. Plant 4/Intake No. 5.

Photo 8.10-7. SCE Office at Plant 4.

Photo 8.10-8. Plant 3/Intake No. 4 Facilities.

Photo 8.10-9. Plant 3 Spillway.

Photo 8.10-10. Plant 2 Facilities.

Photo 8.10-11. Bishop Creek below Plant 2

Photo 8.10-12. Intake No. 2 Reservoir and Facilities.

Photo 8.10-13. Intake No. 2 Dam.

Photo 8.10-14. Birch-McGee Diversion.

Photo 8.10-15. McGee Creek Diversion.

Photo 8.10-16. Longley Dam and Lake.

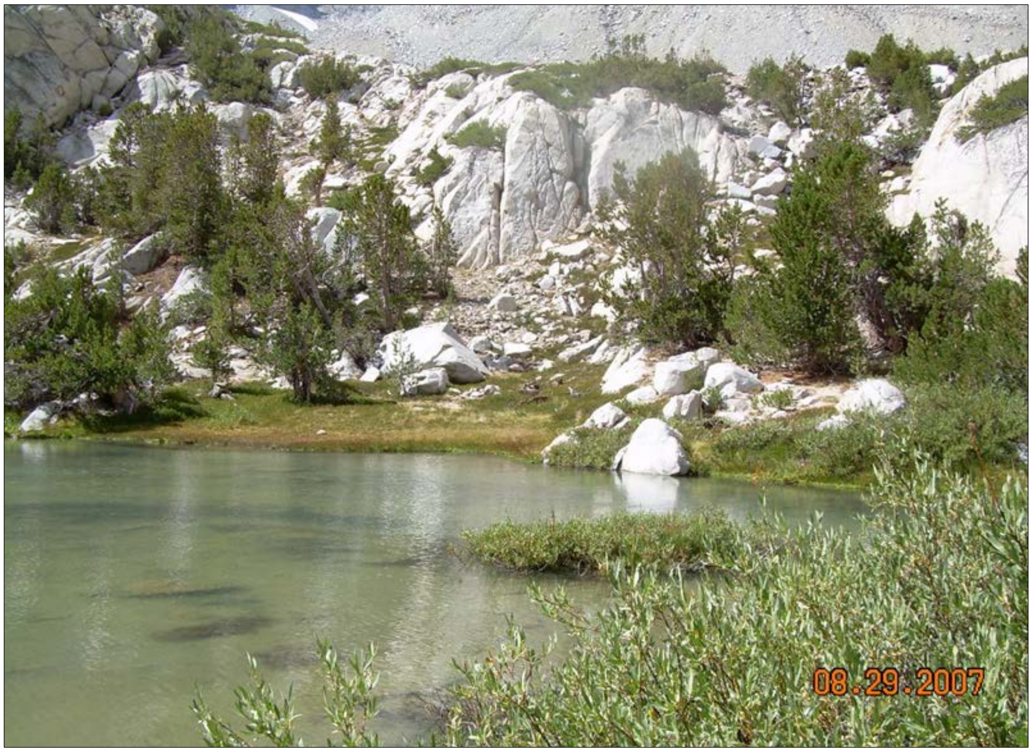

Photo 8.10-17. Below Longley Dam.

Photo 8.10-18. South Lake.

Photo 8.10-19. Hillside Dam.

Photo 8.10-20. Lake Sabrina Dam.

Photo 8.10-21. Lake Sabrina Low Level Outlet Release to Middle Fork Bishop Creek.

Photo 8.10-22. Typical Inyo National Forest Service Signage at Recreation Facilities.

8.10.7 References

Bureau of Land Management (BLM). 1993. Bishop Resource Management Plan Record of Decision. Bakersfield District, Bishop, CA.

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8.11 CULTURAL RESOURCES

This section discusses Cultural Resources that have the potential to occur or have been identified in the Bishop Creek Project area. The discussion here is intended to provide a background for evaluating potential issues as summarized in the Cultural Resources FTR for Archaeology, and the Built Environment, (to be filed as Confidential with the FLA) relating to the Proposed Action; and how the completed studies inform our understanding of Bishop Creek Project effects.

The Study Area for the Cultural Resource Studies was developed in accordance with the requirements of Section 106 of the NHPA, as codified in 36 CFR Part 800, which requires FERC to develop an area of potential effect (APE) for the Bishop Creek Project. Under 36 CFR Part 800, an APE is defined as “the geographic area or areas within which an undertaking may cause changes in the character or use of historic properties” (36 CFR 800.16[d]). An undertaking may have an adverse effect on historic properties when it directly or indirectly alters any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Adverse effects can include but are not limited to: physical destruction of or damage to all or part of a historic property; alteration of a historic property that is not consistent with the Secretary of the Interior (SOI) Standards for the Treatment of Historic Properties (36 CFR Part 68); removal of a historic property from its historic location; change of the character of the historic property’s use; introduction of visual, atmospheric, or audible elements that undermine the integrity of the property; neglect of a historic property; and transfer, lease, or sale of a property out of federal ownership (36 CFR Part 800.5).

For the study, the APE was defined as the FERC Project boundary. During the 2020 fieldwork, it was evident that the current FERC boundary, as mapped, did not match the text description of the current boundary in the vicinity of the free-flowing portions of Birch Creek, McGee Creek, Middle Fork Bishop Creek, and South Fork Bishop Creek, likely due to mapping inconsistencies and technological advances with GIS tools. The APE now consists of the current and corrected FERC boundary as well as the proposed FERC boundary (Section 5.3). The corrected FERC boundary corrects the alignment of the APE, primarily along the free-flowing portions of the creeks. The proposed FERC boundary includes the additional access routes and staging areas added to the project in 2021. The APE is depicted on Figure 8.11-1. The current FERC Project boundary and any changes being proposed as part of this DLA are discussed in Section 5.3.

Cultural resource(s), for the purpose of this document, is used to discuss any prehistoric or historic-period district, archaeological site, building, structure, object, landscape, or Traditional Cultural Resource (TCR), regardless of its National Register eligibility.

Historic property(ies), as defined under 36 CFR §800.16(l) (1), are prehistoric or historic archaeological sites, buildings, structures, objects, districts, or TCP included in, or eligible for inclusion in, the NRHP. Historic properties are identified through a process of evaluation against specific NRHP criteria in 36 CFR § 60.4.

A district is a geographic area containing a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically, or aesthetically by plan and physical development. Examples of districts include (but are not limited to) prehistoric archaeological site complexes, hydroelectric projects, residential areas, commercial zones, mining complexes, transportation networks, rural villages, canal systems, irrigation systems, or large ranches (NPS 1997).

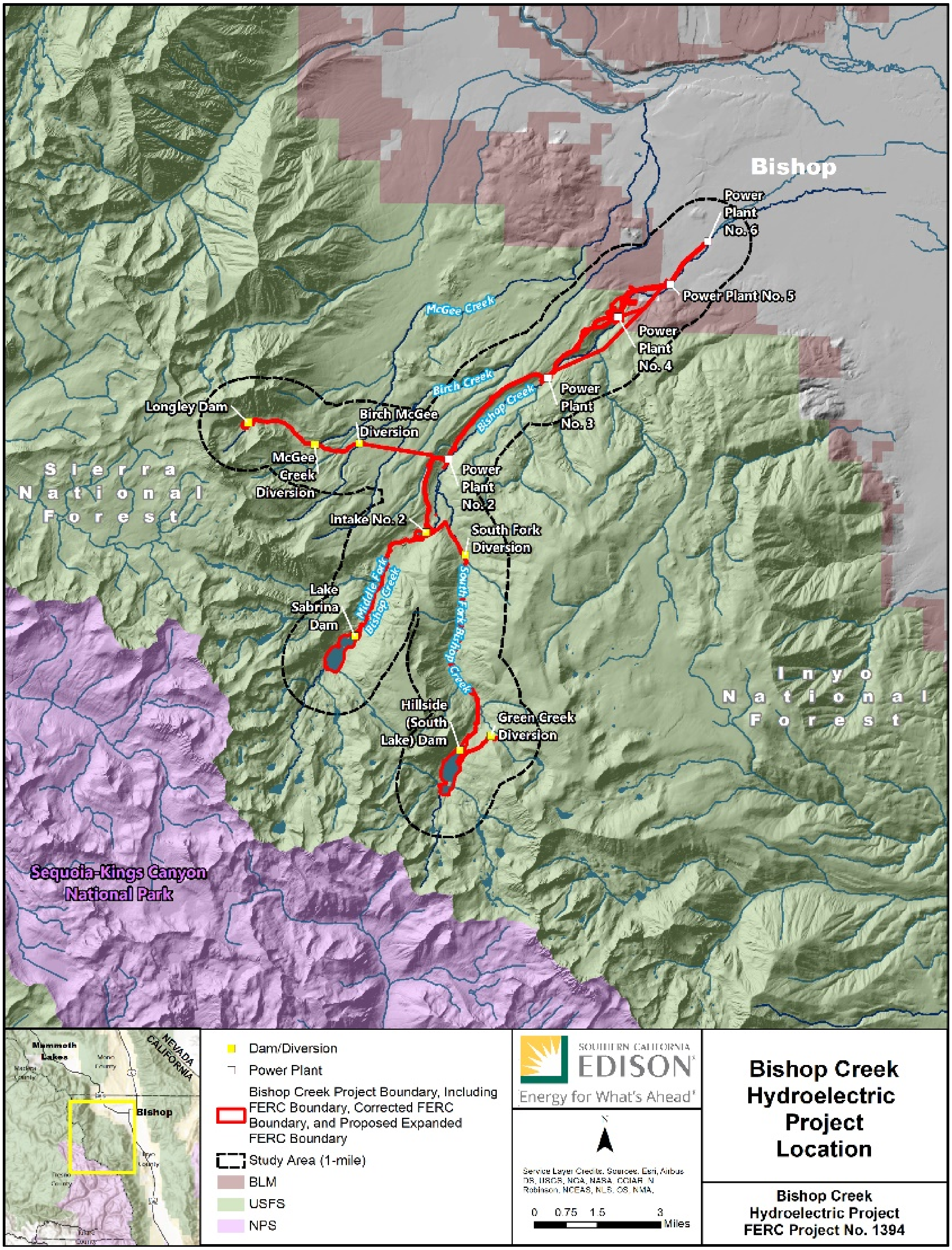

Figure 8.11-1. Bishop Creek Project Cultural APE.

8.11.1 Overview

Cultural resources include an overview of the prehistoric, Native American ethnographic, and historic settings, a description of archaeological and built environments within the APE.

SCE evaluated existing information regarding archeological, built environment, TCPs, and tribal cultural resources within the APE. Records and maps from the INF, BLM, and the Eastern Information Center (EIC) of the California Historical Resources Information Center at the University of California, Riverside were used to gather information on existing cultural resources, past settlements, and subsistence practices, as well as past land use.

Draft technical reports for archeology and built environment resources have not yet been reviewed by agencies or Tribes. Therefore, the information and recommendations discussed in this Cultural Resources section are proposed. Final technical reports will be included in the FLA.

In 2020 and 2021 the Bishop Creek Relicensing Team, along with Tribal Monitor Harry Williams, conducted a pedestrian survey throughout the APE to:

- Identify all known and previously undiscovered archaeological and built-environment resources that may potentially be affected by Bishop Creek Project O&M activities;
- Assess the conditions and integrity of previously identified archaeological and built-environment resources to determine their eligibility for continues or new listing in the NRHP; and
- Inventory and evaluate new-found archaeological and built environment resources within or associated with resource within the APE.

8.11.1.1 Physical Environment and Climate

The Bishop Creek Project is located in a narrow canyon drained by the Middle Fork of Bishop Creek. Bishop Creek drains the east side of Sierra Nevada from Mount Humphrey to the north to Mount Agassiz to the south. The Middle Fork has carved a narrow canyon surrounded by lofty mountains, including Mount Emerson (elevation 13,225 feet) and Table Mountain (10,500 feet). Bishop Creek drops over 1,100 feet in elevation between Lake Sabrina and its confluence with the South Fork of Bishop Creek.

The White Mountains east of Owens Valley are located at a junction between the temperate effects of the Pacific Ocean on the west and the more intense weather of the North American interior (Hall, 1991). The Sierra Nevada block the onslaught of Pacific Ocean moisture, creating a rain shadow that extends across Owens Valley and into the White Mountains.

Seasonal temperatures in the Bishop area are highly variable, with summer highs averaging 98°F with an average low of 56°F. The winter high averages 54°F with an average low of 23°F.

Precipitation in the region is common throughout the year. At higher elevations, an average of 20 inches of precipitation accumulates throughout the year, mostly in the form of snow. Lower elevations receive less, an average of 4 to 6 inches of rainfall. Both snowstorms and thunderstorms are prevalent in the region. Thunderstorms are most common between June and September when cloudbursts can cause flash flooding in canyons and surrounding areas. Heavy winds are frequent during both the summer and winter, reaching speeds of up to 100 miles per hour.

8.11.1.2 Geology

The APE and Bishop Creek Project boundary follow a series of linear corridors along Bishop Creek's mainstem drainage and tributaries emanating from glacial amphitheaters in the high central Sierra Nevada. The study corridor connecting Longley Lake to Bishop Creek is an exception, but it occupies a similar cirque and outwash setting as it traverses the mountain-front prior to joining the Bishop Creek system. Bishop Creek Project corridors originate at reservoirs, likely developed by augmenting tarns or glacial-fed lakes, within or below glacial cirques at the hydrographic and orographic boundary—the crest of the Sierra Nevada—separating the Central Valley from the internally drained Great Basin. The Bishop Creek Project boundary extends downstream to the Late Pleistocene- to Holocene-age alluvial fan of Bishop Creek and generally young landforms that extend toward the Owens River and the town of Bishop, California.

Glacial landforms, especially the prominent lateral moraines, along the U-shaped valley of Bishop Creek formed during the latest Tioga phase (or phases, from 28,000 to 14,500 years ago) of Late Pleistocene glaciation (Phillips et al. 2009). The Tioga cycles (at least four) of advance and retreat scoured and erased the earlier Tahoe phase traces. However, higher and older Tahoe deposits (at least 42,000 and probably older; Moore and Mack 2008) confined the Tioga glaciation and reworking to the canyons. The earlier Tahoe glaciation produced the end moraines, till, and outwash deposits that extend valleyward in a broad, curving expanse of undulating ridges and swales.

The upper reaches of the Middle and South Forks of Bishop Creek are generally similar. Delivered from glacially cut, over-steepened margins of the U-shaped valleys, colluvial slopes and occasional talus aprons interfinger with narrow floodplains of the stepped, valley-bottom drainages. Emanating from the lower cirque and once wet meadow—now regularly inundated—of the basin of South Lake reservoir, the South Fork of Bishop Creek shows hints of two erosional terraces (T1 and T2, lower and higher, respectively) along segments not buried by colluvium. Other portions of the South Fork drainage cut to glacial steps and gouges where ground moraine remnants are perched on bedrock outcrops. The upper Middle Fork of Bishop Creek originates at the intermediate cirque and alpine meadow of the basin of Lake Sabrina. This reach generally lacks alluvial terraces along its straight-running, bedrock-confined course. Archaeological sites are generally confined to small areas on isolated terraces, riparian corridors, or in boulder moraines. All are typically recent, with active processes within the confined drainages and steep slopes discouraging long-term preservation and limiting potential for stratigraphically separated or otherwise buried cultural deposits.

Below the confluence of the Middle and South Forks, as the drainages coalesce as “Bishop Creek,” areas of ground moraine and recessional glacial features are anchored on small bedrock outcrops formed by en-echelon fault lines that run generally parallel to the mountain front but cut perpendicularly across the drainages. These can entrap sediments, forming inset floodplains subject to occasional scour and replenishment. Massive till boulders, scoured from the plutonic bedrock, are piled as end moraines or as ground mass on and within the floodplain. These recessional and ground moraines can locally divert drainage patterns or block stream and groundwater flow to form ponds and wetlands along the narrow, segmented floodplain.

Approaching the mountain front where the glacially carved valley widens, a series of floodplain terraces transition to the expansive outwash and alluvial fan that begins a long curve toward the Owens River. There are at least five terraces varying from young erosional straths (T1, T2, and T3, lower to higher) within the prominent, entrenched drainage of Bishop Creek, to the expansive, berm and swale surfaces (T4 and T5) that formed as glacial outwash debouched in the meltwater and floods of the glacial recession. The T1 terrace is recent outwash and sandy bedload of the modern drainage. The T2 and T3 are stepped above the drainage and are prominent on the inside slopes as the drainage bends generally eastward, down-fan. The terrace straths appear to be erosional cuts with thin to moderately deep (more than 1 meter) veneers of alluvium, derived primarily from the adjacent terrace risers. Archaeological sites (precontact and historic-period) are common on these terraces and have significant depth potential; however, stratified archaeological components—known in the distal reaches of the Bishop Creek fan—are not anticipated due to the shallow veneer and active slope process. The APE often occupies or closely parallels these terraces in the proximal and medial segment of the outwash fan.

The T4 and T5 surfaces comprise expansive, relict surfaces of the outwash fan of Bishop Creek. Berm and swale topography marks past outwash floods that spread basin-ward prior to the downcutting of the modern drainage. Boulders of all sizes mark the berms, while gravelly to silty sand fills the swales. Archaeological resources are distributed broadly on these fans surfaces with some localities having potential for buried cultural deposits within the finer-grained packages of local swales, and others with rock features (e.g., bedrock mortars [BRM], alignments) in bouldery berms.

The terraces may mark periods of drainage stability following powerful floods. This is certainly true of the higher, outwash surfaces of the T4 and T5 terraces. On the other hand, the terraces may also be tectonic markers, with floodplain abandonment and drainage incision due to mountain uplift and base-level lowering.

Where the APE extends westward to Longley Lake, it traverses the headward sections of the coalesced alluvial fans of Birch, Horse, and McGee creeks. These inset fans debouch between lateral moraines that protrude from the mountain front. In the confinement of the moraines, wet meadow basins and floodplains form. These depositional meadows may hold buried archaeological components in shallow, sometimes saturated deposits. The bounding lobes and relatively recent berm-and-swale outwash have little potential for significant buried deposits. The upper reach of McGee Creek enters a confined canyon below Longley Lake. Archaeological remains are not commonly preserved in this active, bedrock-confined drainage.

The age of deposits and surfaces in the canyons and outwash fans of Bishop Creek in APE varies greatly. The canyon corridors encompass small precontact archaeological sites confined to isolated terraces and boulder-strewn moraines. Most of these sites are recent (i.e., Middle to Late Holocene) and shallow due to the active processes of the narrow canyons. Floodplain and terrace deposits in the widening canyon, near where the canyon leaves the mountain front, are typically recent and have the potential to preserve buried archaeological assemblages or paleosurfaces. Sites have the potential for substantive buried context, but stratigraphic separation of components may be limited due to punctuated, high-energy events that lead to terrace formation. Where the corridor leaves the young, inset floodplains and terraces, the outwash and moraines hold a shallow, active veneer of sheetwash and aeolian deposits. Archaeological assemblages may be buried on fan surfaces (rarely on moraines), but contexts will have limited depth potential.

Evaluation and further investigation of archaeological resources documented within the Bishop Creek Project corridors, including seeking temporal information obtained from surface and buried assemblages, may help clarify or resolve temporal relationships among terraces, surfaces, and other landforms. This information may also clarify the forces and processes behind terrace formation, contributing to documentation of landform changes due to interaction between climate, tectonics, paleoenvironment, and archaeological site formation.

8.11.1.3 Flora and Fauna

Botanical resources consist of a canopy cover that includes canyon live oak, Jeffrey pine, ponderosa pine, limber pine, lodgepole pine, singleleaf pinyon, mountain hemlock, and whitebark pine. The understory is dominated by a long list of shrubs including but not limited to creambush, Green’s goldenweed, mountain white heather, antelope bitterbrush, desert bitterbrush, black brush, Mormon tea, white bursage, salt bush, curlleaf mountain mahogany, sagebrush, mountain sagebrush, and snowberry. Forbs are abundant and include phlox, various butterweeds, 10 species of buckwheat, knotweed, buttercup, mountain sorrel, Indian paint brush, with non-native wild oats, fiddleneck, stork’s bill, and non-native grasses also found.

Numerous species of fauna are present in the area. Large mammals in the area include mule deer and bighorn sheep while small mammals consist of several carnivores, such as badger, coyote, mountain lion and bobcat. Lagomorphs include American pika and jackrabbit (white and black tailed). Rodents include California ground squirrel, least chipmunk, valley pocket gopher, and several varieties of mice. Amphibians and reptiles are also present in large numbers. Snakes common to the area include the western rattlesnake, western terrestrial garter snake (*Thamnophis elegans*), gopher, and California king snake.

8.11.2 CULTURAL SETTING OF THE PROJECT AND VICINITY

8.11.2.1 Precontact Period

With a well-documented history of occupation dating back to the early Holocene and culminating in the incipient agricultural practices documented at historic contact, Owens Valley has long been an area of interest for archaeological research that focuses on changes in subsistence practices and settlement patterns in response to environmental challenges. This discussion provides a general review of the precontact history of the region. Following the original formulation by Bettinger and Taylor (1974) as modified by Basgall and Giambastiani (1995) and others, local prehistory is divided into five temporal intervals: Early Holocene (pre-8200 calibrated years before [cal B.P.]); Middle Holocene (8200–3400 cal B.P.); Newberry (3400–1300 cal B.P.); Haiwee (1300–600 cal B.P.); and Marana (600–150 cal B.P.). The first two intervals are general Holocene epoch subdivisions (Walker et al. 2012), while the last three intervals are culture-historical periods, defined by changes in material culture (Table 8.11-1).

Table 8.11-1. Precontact Chronology of Owens Valley

Time Period	Time Range (Cal BP)	Diagnostic Artifacts	Subsistence/Settlement Trends
Early Holocene	pre-8200	Great Basin Concave Base, Great Basin Stemmed projectile points; crescents; formed flake tools	Very high residential mobility, emphasis on hunting
Middle Holocene	8200-3400	Pinto and Fish Slough series projectile points	Continued high residential mobility; minor increase in emphasis on plant foods
Newberry Period	3400-1300	Elko and Humboldt series projectile points	Lower residential mobility with systematized seasonal round, development of residential bases, increase in obsidian quarrying and development of exchange networks
Haiwee Period	1300-600	Rose Spring and Eastgate series projectile points	Continued decrease in settlement range and development of major residential bases; collapse of obsidian exchange networks; increasing intensification on lower-return resources
Marana Period	post-600	Cottonwood and Desert Side-notched projectile points; Owens Valley Brownware pottery	Still smaller settlement ranges; intensified use of ubiquitous, lower-return resources; incipient agriculture

Evidence of Early Holocene occupation in the Inyo-Mono area is relatively sparse, represented by a few widely scattered sites (Basgall 1987, 1988; Hall 1990). Most of these sites are marked by the presence of Great Basin Stemmed (Silver Lake, Lake Mohave) and Great Basin Concave Base projectile points. Bifurcate-base Pinto points, nominally a Middle Holocene marker, seem to make their initial appearance during this interval as well (Rosenthal and Ugan 2013). Other important artifact types include formalized flake tools (i.e., scrapers, gravers), crescents, and other bifaces, while milling equipment is quite rare. These assemblages reflect a very high degree of residential mobility, as indicated by geochemical studies showing a wide variety of distant source materials in lithic toolkits (Basgall 1989; Delacorte 1999); minimal use of seed resources, based on the near absence of milling equipment; and an emphasis on hunting, with smaller game particularly prevalent in the more arid parts of the region (Hall 1990).

The Middle Holocene (8200 to 3400 before present [cal B.P.]) is marked by continued use of Pinto series points. In the northern Owens Valley, the Fish Slough side-notched type is a locally important marker (Basgall and Giambastiani 1995). Middle Holocene assemblages are generally similar to those of the Early Holocene with respect to patterns of flaked stone material acquisition, settlement and subsistence. They differ by showing an increase in the frequency of milling equipment, a shift probably reflecting a broadening subsistence base in response to warmer and drier environmental conditions (Warren and Crabtree 1986). The Stahl site at Little Lake contains hearths, graves, possible residential structures, and a diverse assemblage of flaked and ground stone tools (Harrington 1957; Schroth 1994); all are attributes consistent with a repeatedly occupied residential base. While this site is located well south of the APE, such Middle Holocene sites are rare throughout Owens Valley, and in fact there is a noticeable gap in all site types dating to this interval is apparent in the region (Basgall 2009).

Markers of the Newberry Period (3400 to 1300 cal B.P.) include Humboldt and Elko series projectile points. During this interval, the precontact settlement system remained mobile but appears to have been less spatially expansive, with greater regularity in the direction and range of seasonal movements (Basgall and McGuire 1988; Bettinger 1989, 1999a, 1999b; Bettinger et al. 1984). Many researchers argue that Newberry Period Owens Valley groups moved in a seasonal round up and down the valley, establishing a series of repeatedly occupied residential bases (Basgall and Delacorte 2012). Others argue that these sites served as longer-term logistical bases and that evidence for such a seasonal round is unconvincing (King et al. 2001; McGuire and Hildebrandt 2005). Either way, these lowland sites appear to have been occupied and reoccupied for significant periods of time, judging from the presence of substantial residential structures, as well as a variety of resources from high-elevation habitats (e.g., pinyon pine, bighorn sheep, marmots). The latter probably reflects use of upland areas by task-specific groups.

Another important aspect of the Newberry Period is the trans-Sierran exchange of obsidian, which reached its peak during this interval. The expansion of this exchange network is indicated by an increase in quarry production and biface manufacture at several eastern California sources, as well as increases in the frequency of obsidian in sites west of the Sierra Nevada (Gilreath and Hildebrandt 2011; King et al. 2011). It has been argued that trade blossomed during this interval because the regularized settlement pattern allowed for more predictable interaction among neighboring populations.

The Haiwee Period (1300 to 600 cal B.P.) is marked by the introduction of the bow and arrow, represented by the Rose Spring and Eastgate projectile point types. In addition to this major technological change, it appears that a restructuring of local subsistence-settlement systems also occurred. Excavations throughout the region indicate the emergence of permanent or semi-permanent lowland villages, with residential structures, bedrock milling features, extensive assemblages of flaked and ground stone tools, and diverse floral and faunal remains. Such residences were probably supported by more temporary upland pinyon camps and centralized seed production stations in the valley bottoms (Basgall and McGuire 1988; Bettinger 1989). The relationship between these sites indicates that seasonal movements had become yet more spatially confined, resulting in more intensive use of local resources within progressively smaller foraging areas. Reduced residential mobility is indicated by decreased flaked stone material diversity, and greater use of expedient milling equipment (Basgall 1989; Basgall and Giambastiani 1995; Basgall and McGuire 1988; Bettinger 1989, 1999a, 1999b).

Concurrent with the restructuring of lowland settlement, residential occupation of certain high-elevation areas began during the Haiwee Period. This includes the high-elevation “villages” of the White Mountains (Bettinger 1991), and similar, though smaller-scale, residential use of the Sierran alpine and subalpine zones (Roper Wickstrom 1993; Stevens 2005). During the Haiwee Period, production and exchange of eastern California obsidians essentially collapsed (Gilreath and Hildebrandt 2011; King et al. 2011). This has been attributed to a variety of factors, including increasing territoriality that disrupted long-distance exchange, and changes in flaked stone technology that reduced demand.

Key indicators of the Marana Period (post-600 cal B.P.) include Cottonwood and Desert Side-notched projectile points and Owens Valley Brownware pottery. Many of the trends established in the Haiwee Period continued during this interval, including still smaller settlement ranges, increased territoriality, and the even more intensive use of ubiquitous, locally available resources that often required more energy to harvest and prepare than ones available further afield; these included increased use of riparian and lacustrine resources in Owens Valley, pinyon in the intermediate zones, and root crops and small mammals in the alpine zones of the White Mountains and the Sierra Nevada. This adaptive trajectory toward intensification is reflected in the lifeways of the contact-period of the Owens Valley Paiute, including their use of ditch irrigation.

8.11.2.2 Archaeological Investigations

Within the immediate Project area, test excavations were conducted by York (1988) at 13 precontact site components as part of a previous relicensing effort. This testing revealed the majority of the precontact components to be small, shallow deposits of flaked stone; however, a few sites contained more substantial deposits containing ground stone and midden soil. One site, CA-INY-3461/H, included the remains of a steatite vessel likely imported from the western Sierra. Obsidian hydration and diagnostic projectile point types suggested occupation from the Newberry through Marana periods, and possibly extending into historic times based on associations with typically historic artifacts (e.g., wagon parts at site CA-INY-3467/H, perforated can lids interpreted elsewhere as Native basketry-making tools), although clear associations between typically precontact and post-contact materials were not always easy to demonstrate. Geochemical sourcing of the obsidian revealed a wide variety of obsidian sources, and notable variability between sites, suggesting the possibility of tracking trends over time in obsidian procurement and accompanying patterns of trade and settlement.

In the lower elevations of the Project area, Bishop Paiute Tribal Member Harry Williams and colleagues have conducted research into Paiute irrigation ditches, using historical maps such as General Land Office (GLO) plats and ethnographic data such as that presented by Steward (1933), in combination with field visits; some of these features have been formally recorded as archaeological sites, while others have not. Morrow (2014) maps a set of ditches extending across the Bishop Creek fan, from the vicinity of Power Plant No. 5 and extending primarily south and east of the current creek. These ditches present an enigma for archaeologists, since many have clearly been used into the historic period, and unambiguous markers of Native American manufacture are not as obvious as they are for other feature types.

A large number of sites have been investigated along the US Highway 395 corridor as a result of Caltrans-sponsored studies (Basgall and Delacorte 2012; Basgall et al. 2003; Eerkens and King 2002). Among these are the major complex of mostly Newberry-period residential structures along McGee and Birch Creeks, on the valley floor just north of the Bishop Creek Project area (Basgall and Delacorte 2012). Basgall and Delacorte (2012) interpret the numerous Newberry house floor features at CA-INY-1384/H as the result of a repeated series of seasonal occupations by relatively small groups practicing a regularized seasonal round, rather than a single, more substantial occupation by a village-sized group, as other interpretations of Newberry settlement patterns have argued (e.g., McGuire and Hildebrandt 2005, King et al. 2001). A well-preserved Marana-period house was excavated at CA-INY-1384/H.

In the Sherwin Summit area, approximately 9 miles north of the APE, Eerkens and King (2002) documented numerous small surface rock rings, likely the remnants of Haiwee- and Marana-period (and possibly also historic-period) green-cone pinyon caches, attesting to the increased importance of this resource in the intensified subsistence regimes of later periods.

8.11.2.3 Native American Ethnography/Ethnohistory

The following section is provided as background for the Bishop Creek archaeological studies. A separate FTR for Tribal Resources (CUL-2, in preparation) and Exhibit E Section 8.13 provides detailed American Indian ethnohistoric data, background information about Tribal matters of importance, and an American Indian contextual history to provide a basis for analysis of sites with chronological values dating the last 200 years or so.

The Bishop Creek drainage in the northern Owens Valley is the heartland of the Owens Valley Paiute, a people who spoke Northeastern Mono, a subgroup of the Uto-Aztecan language family (Golla 2011). Ethnohistoric boundaries or shared areas between ethnohistoric American Indian groups are most commonly created based on the language people spoke near the time of initial contact. Fowler and Liljeblad (1986) (Figure 8.11-2) show Owens Valley Paiute territory extending westerly to Piute Pass in the upper drainage of Bishop Creek, northeasterly to Fish Lake Valley on the east side of the White Mountains, southeasterly along the western piedmont of the Inyo Mountains, southerly to Owens Lake, and the most northerly to Mammoth Lakes and Benton. Shared territory with the adjoining Northern Paiute took in the northern portion of Long Valley (Fowler and Liljeblad 1986). Shared areas with the Western Shoshone included the eastern banks of Fish Lake Valley at the Silver Peak Range in Nevada and extended southerly towards the Coso Range and Panamint Mountains. Much of this territorial description relies on Julian Steward’s 1930s work with the Owens Valley people (e.g., Steward 1933). Other ethnographers place the Owens Valley Paiute northern boundary just north of the Volcanic Tableland/Round Valley, toward current Crowley Lake, where land was shared with the southernmost Northern Paiute group, the Kutzadikaa; Merriam (n.d.), for example, clearly demarcated a boundary between the two groups at or about Toms Place and understood that the Mono Lake people are Northern Paiute speakers. This boundary is based on linguistic data and on the data from Tribal experts gathered by ethnographers who preceded and post-dated Steward.

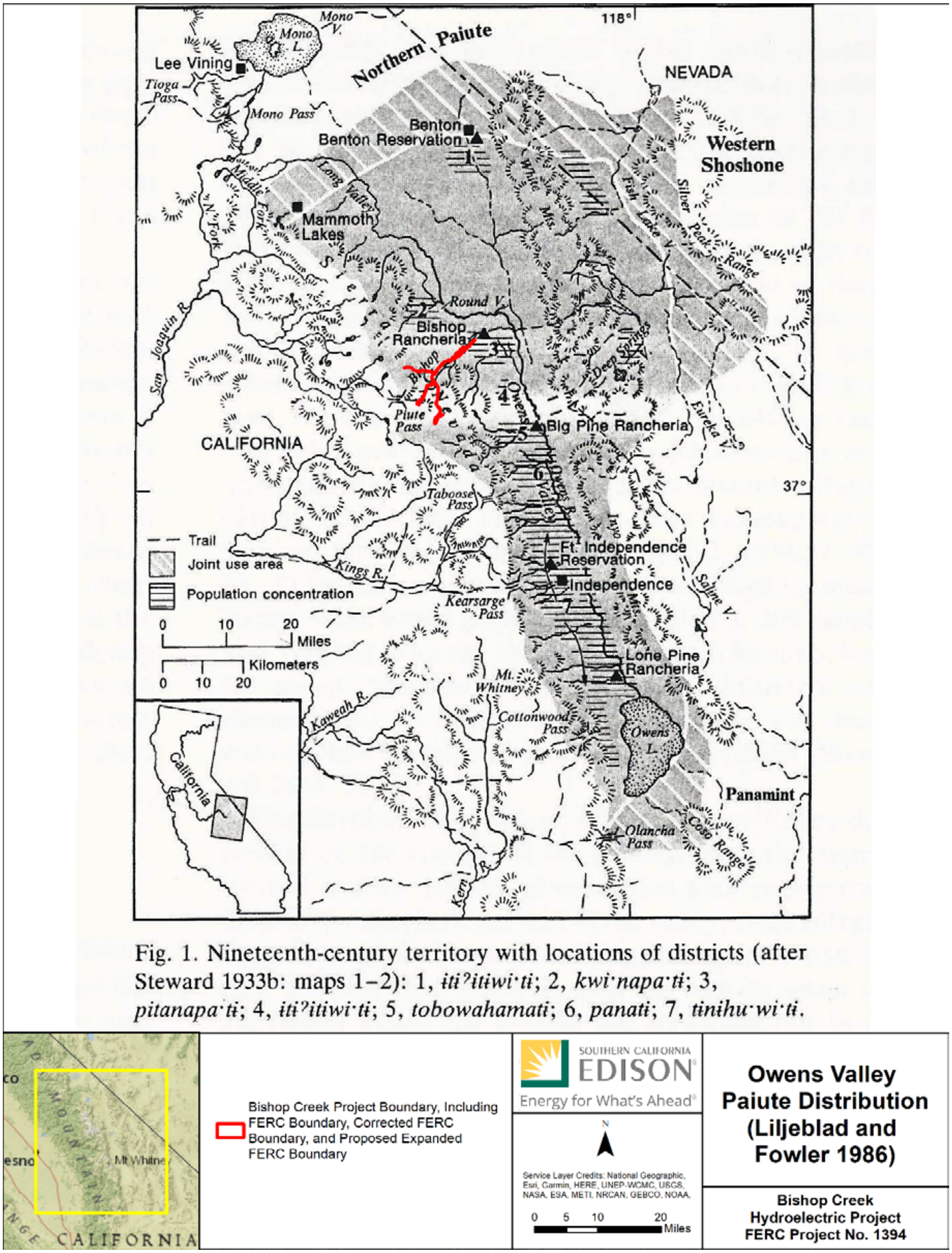

Fig. 1. Nineteenth-century territory with locations of districts (after Steward 1933b: maps 1–2): 1, *itiˀitiwi·ti*; 2, *kwi·napa·ti*; 3, *pitanapa·ti*; 4, *itiˀitiwi·ti*; 5, *tobowahamati*; 6, *panati*; 7, *tinihu·wi·ti*.

Figure 8.11-2. Nineteenth Century Owens Valley Paiute Territory from Fowler and Liljeblad (1986) with Bishop Creek APE Plotted in Red.

Historic Owens Valley Paiute were characterized by greater sociopolitical complexity than elsewhere in the Great Basin. Bettinger's (1978) suggestion that Owens Valley groups resided at lowland village sites for much of the year agreed with Steward's (1938) proposition that the abundance of natural resources in the valley allowed people to live in groups with multiple families, totaling between 25 and 250 people, and likely occupying villages of varied sizes. Each village was integrated within a larger district with band boundaries that extended through the Owens Valley (Steward 1938). Hereditary headmen controlled access to specific resources such as pine nut groves and fishing areas (Steward 1933).

According to most sources (e.g., Bettinger 1982; Lawton et al. 1976; Steward 1933; Treganza 1956), Paiute groups in the Bishop area grew crops within irrigated plots that were "owned" by each district. Map 2 of Julian Steward's 1933 *Ethnography of the Owens Valley Paiute* depicts several places that were utilized within and near the APE (Figure 8.11-3). This map indicates *huki* (desert needle grass, *Stipa speciosa*), *pozida* (tomcat clover, *Trifolium willdenovii*), taboose (blue dicks/grass nuts, *Dichelostemma capitatum*), and *nay-hay-vita* (spike rush, *Eleocharis* spp.) as being irrigated by Bishop Creek water in lands within and adjacent to the Bishop Creek Project. Lawton and colleagues (1976) further confirmed this utilization and concluded that Owens Valley agriculture was complex, intimating that soil tilling and cultivation must have been involved, even if constructed earthworks were used simply to increase water flow to unmodified lands. Several of the ditches used by the Bishop Paiute have been identified and described. Some intersect the APE. How long irrigation occurred in the area is presently unknown; it is also uncertain how long American Indians practiced irrigation as part of their subsistence base.

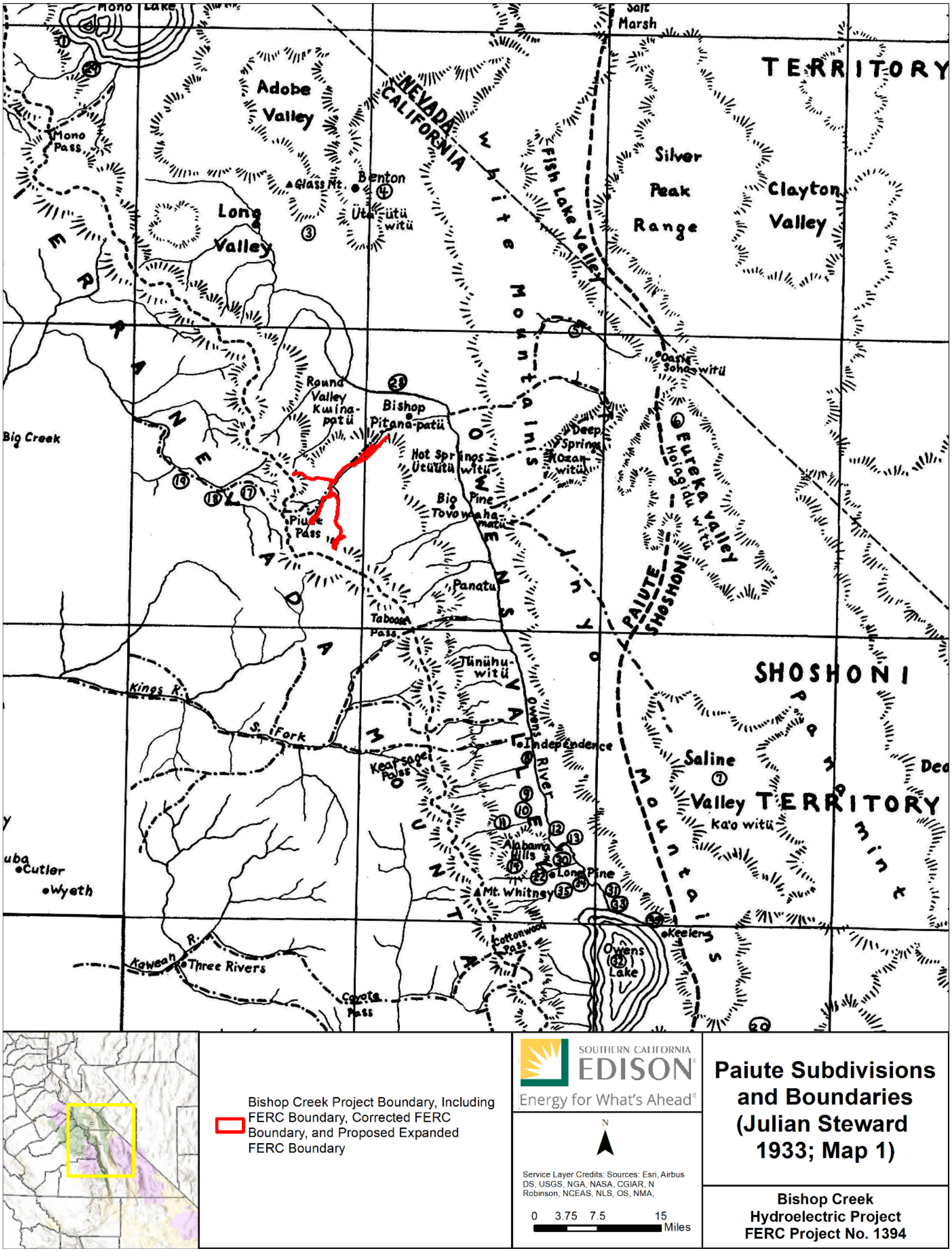

Figure 8.11-3. Owens Valley Ethnographic Map from Steward (1933) with Bishop Creek APE Plotted in Red.

Fowler and Liljeblad (1986) discuss the cultural traditions and oral history of both Nim and Owens Valley Paiute from Bishop, that Bishop was the place from which the North Fork (Madera County) people originated, and indeed, the language, customs, and stories between Nim and Bishop Paiute share great affinity and similarity. The people of Bishop traveled westerly through the various Sierran passes (Pine Creek, Piute, and various "Mono" passes), with trail networks being important to communication, transportation, and trade. At least one of these corridors, the trail leading to Piute Pass via North Lake has a general alignment in the Bishop Creek Project study area.

While relations between the Owens Valley Paiute and the early European and American settlers were generally less hostile than elsewhere in California, conflicts did occur. During the winter of 1861 to 1862, with their irrigated fields having been damaged or destroyed by cattle, the Owens Valley Paiute began to raid cattle herds for food. Altercations took place up and down Owens Valley, and indeed, the eastern side of California, with Lieutenant Colonel George S. Evans arriving in early April 1862 (Davis et al. 1897) to find that a battle had occurred at Lone Pine, and at Fort Independence, settlers were said to be within the fort due to the destruction and burning of their homes. In the first week of April 1862, Evans described a battle between the "badly whipped [Americans, and]…the Indians, numbering some 400 or 500, a great many of them with good fire-arms, [who] had come out of the canyons and mountain ravines" (Davis et al. 1897:47; *Red Bluff Semi-Weekly Independent* 1862). Evans soon increased his estimate of the opposition numbers to 500–700 Indians who he said were positioned in the rocks in a canyon above Bishop's Creek. Although he endeavored to defend his position, he "saw that it would be madness and no less than murder to attempt to go any farther; that I could do nothing but get half of my men killed without as much as getting a fair shot at an Indian… After returning to the horses and trying for some time without avail to get the Indians out into the valley, I fell back to Bishop's Creek" (Davis et al. 1897:48). The story of this interaction and the ensuing events are of import in the Bishop Creek Project study area, and certain locations of this interaction are within the study area and landscape of the Bishop Creek Project; portions may be in the APE.

Evans' (Davis et al. 1897:146) letter report to headquarters represented what seems to be the Indian point of view in 1862: "The Indians claim the valley as belonging to them, and still insist upon it that no white man shall settle, or as they term it, sit down in the valley. They say that the whites may pass through to and from Aurora if they want to, or they may locate in the hills and work the mines but must not sit down on the grass patches." By sitting down on the grass patches, it is likely that the Native people were speaking of both the cattle grazing and also settlement. Evans wrote that the Indians subsisted "entirely upon the grass seeds and nuts gathered in the valley from the lake up," along with other foods (Davis et al. 1897:146).

Following this time, American settlers began to retaliate, and the U.S. Army began a systematic destruction of Owens Valley Paiute foodstuffs and lifeways, ultimately removing most forced by march to several locales in Kern and Tulare counties (Davis-King 2003). By the time the Paiute could escape or otherwise return to Owens Valley, the non-American Indian people had overtaken the prime waters and grazing lands of the area, overlapping the former village and agricultural plots.

Inyo County was established in 1866 from Tulare and Mono counties. The first land patents were filed that same year (Inyo County Assessor's Office Official Records). Ranch lands were divided, and the Indians who had endured the horrible years of disease, starvation, murder, indentured servitude, and removal to reservations, now survived in part by attaching themselves to the workforce of the Anglo population, becoming cowboys, cooks, washers, woodcutters, maids, ranch hands, and laborers. Ironically, the impetus of the war in the first place, the bringing of cattle through Owens Valley to the mines, was now to be the source of their survival. Women became laundresses throughout the valley in the early years, being supplanted by the washing machine only after World War II. Many late nineteenth and early twentieth century American Indian sites had wash tub parts on the surface and small depressions that contained the fires used to heat the wash water (Davis-King 1997, and personal observation of Owens Valley historic Indian sites). Metal thimbles are common at nineteenth century Indian sites, as are Prosser buttons and sherds of bleach bottles, further evidence of the role American Indian women played in the laundry activities of that time. Men began working with cattle and riding horses, delivering goods and mail, or caring for large bodies of grazing land. They too brought artifacts back to their homesites: baling wire, spent nails, stove parts, canisters, and metal of many types. In spite of the attachment to Anglo families, traditions, language, and culture survived. Pine nut harvests, for example, took Indian men and women from their employment, as all would gather in the hills to gather and store this important food.

Since the 1850s, there had been discussion about creating a large Owens Valley reservation, but this never happened. Fort Independence was established in 1902, Bishop and Big Pine in 1912, Benton in 1915, Lone Pine Reservation in the late 1930s, and Timbisha as recently as 1982. As the federal government constructed homes for the Native people, built irrigation and consumptive water systems, and undertook the construction of roads within the Tribal land, people began moving onto trust lands, for protection and proximity to relatives and friends. Cultural continuity in language, dance and ceremony, food, some medicines, and general social patterns has persisted and enriches Tribal perspectives.

In describing the past of the people who lived in this region, it is increasingly important to remember the people who are still here. The Bishop Paiute Tribe, the fifth largest in the state of California, remains a vibrant and active part of the eastern Sierra community focusing on education, community development, health, and protection. Traditional activities, such as hunting, gathering medicines and foods like piaggi and pine nuts, fishing, and the irrigation of taboose remain important components of Bishop Paiute life, supported by several Tribal programs. The Owens Valley Paiute-Shoshone Cultural Center supports several activities, including the Tribe's Food Sovereignty Program to encourage the community's use of the organic garden and market, honoring of the gifts of the earth through ceremonial dance (the spring and fall pine nut dances, for example), elders' programs including field trips with Tribal youth, language rejuvenation, and more. These are but some of the Tribal programs that connect the community with their past and their future. The other Tribes surrounding the Bishop Creek Project are similarly connected to their heritage through gathering, hunting, ceremony, language, cultural revitalization, interaction with neighboring groups, and more.

8.11.3 HISTORIC CONTEXT

To set up the historic contexts within which the Bishop Creek Project was developed and within which some of the resources would be evaluated, the history of the proposed APE and surrounding area was divided into the following main themes: early exploration, settlement, ranching, mining and hydroelectric development, pack stations, and recreation residences. A more detailed history of the development of the Bishop Creek Project will be presented in the FTR for built environment resources, to be filed with the FLA.

8.11.3.1 Early Exploration

The earliest non-American Indian explorers of this area were trappers and those sent on military expeditions. The first signs of change came through the fur trade, headed by the Hudson's Bay Company. Jedediah Strong Smith was the first reported white man to cross the Great Basin in his search for beaver. His 1826 travels westerly lead him south of Owens Valley, through the Mojave Desert and into the Los Angeles basin. Soon the Mexican governor, José de Echeandia, deported Smith, extracting a promise that he would return the way he came. Smith instead traveled north, entering the San Joaquin Valley from the Tehachapi Pass, traveling up California's fertile valley in search of beaver. Needing to rendezvous in Salt Lake City, Smith turned east to follow the Stanislaus River canyon, crossing the Sierra Nevada from west to east, again a recorded first, in 1827 (Farquhar 1965). The Smith's return route likely bypassed the Owens Valley, but he inevitably traveled through Northern Paiute country to reach his Utah destination.

Peter Ogden also explored in present-day Inyo County, when he was an agent of the Hudson's Bay Company from 1824 to 1830 (Cline 1963). Cline suggests that the geographical descriptions of his 1829 to 1830 trip from the Rivers Columbia to Colorado indicated he must have crossed the Owens Valley. Within the next two decades, thousands of immigrants would pass through Paiute and Shoshone territory on their way west.

About this same time, First Lieutenant Joseph Reddeford (sometimes spelled Ruddeford) Walker led a military expedition into California. Crossing the Great Basin in 1833 to 1834, he made the first Euroamerican crossing of the Sierra Nevada from east to west. Based on descriptions assumed to be of Yosemite Valley, Walker's early route is thought to have followed the Walker River, perhaps up Virginia Canyon, crossing the Sierra in the vicinity of Mono or Tioga Passes. Walker crossed the Sierra again in 1834 possibly through the pass that now bears his name and on into the Owens Valley. It is here that he followed the western edge of Owens Lake, at the foothills of the Sierra in May 1834.

These expeditions, as well as others, eventually lead to settlement and skirmishes between non-American Indians and the Paiute. Known as the Indian Wars, the skirmishes were brought about due to the Paiute's need to protect their land (Davis-King 2003).

8.11.3.2 Early Settlement

The town of Bishop, California, is named after Samuel A. Bishop, who established a cattle-drive camp in San Francis Ranch approximately 3 miles west of the current town site. Samuel, his wife, her brother Sam Young, E. P. (Stock) Robinson, Pat Gallagher, and several American Indian herders, left Fort Tejon (south of present-day Bakersfield) in July 1861, driving approximately 500 to 600 head of cattle and 50 horses to the Owens Valley with the plan of selling the stock to miners residing there in mining camps. Samuel Bishop resided at San Francis Ranch for only a few years before leaving, after which time the ranch was renamed Bishop Creek (Chalfant 1933; Long and Sprengeler 2009).

Near this time, in 1863, W. P. George and associates established a truck farm west of the present-day town of Bishop. The area was considered good for farming due to the low flat floodplain that could be irrigated using water from Bishop Creek, as well as other sources. Farming quickly became a successful endeavor in the area, according to Inyo historian Willie Arthur Chalfant. By 1879, there were 34 farm claimants drawing water from Bishop Creek (Chalfant 1933).

The first structure in the then town of Bishop Creek was a blacksmith shop John Clark purchased from the Consort Mining Company around 1864 and placed south of West Line Street, near Main Street. At this time, the population of Bishop Creek began to expand due to an influx of people from the mining camp of Owensville, which was located near what is currently the town of Laws, California. In 1903, the town of Bishop Creek voted to incorporate and change its name to Bishop (Chalfant 1933; Walton 1992).

8.11.3.3 Ranching and Irrigation

Samuel Bishop was quickly followed by other settlers interested in cattle ranching in the area. About the same time Bishop arrived in the Owens Valley, Mr. and Mrs. Alney T. McGee and Mr. and Mrs. J. N. Summers and their families completed their own large-scale cattle drive, which had begun in Tulare Valley and headed for Monoville (a settlement approximately 12 mi. southeast of present-day Bridgeport) via Walker's Pass (Chalfant 1933).

Other cattlemen soon arrived in the area and decided to winter their herds on the rich grazing lands of Owens Valley. The winter of 1861 to 1862 was extremely harsh, and the cattle consumed many of the plants that the Paiute relied upon for sustenance. As a result, starvation forced the Paiute to kill the cattle for food, which in turn created tension with the ranchers. Whites attempted to defuse the situation by calling a meeting that ended in the negotiation of a treaty that agreed to allow the Paiute to continue their food-gathering pursuits in exchange for not driving off or killing cattle in the valley. In a glaring omission, the treaty ignored the problem of the cattle consuming the Paiute's food, and an intermittent state of war broke out between the Paiute and settlers, lasting until the Paiute were forcibly marched from their ancestral land to a reservation at Fort Tejon in 1863. When hostilities ceased, settlers started entering the valley to set up farms and ranches, both of which proved profitable until the land-grabbing and water-diversion activities of the city of Los Angeles, Bureau of Water Works and Supply, LADWP in the early part of the twentieth century (Chalfant 1933; Walton 1992). Many of the Paiute escaped Fort Tejon and returned to Owens Valley.

After the completion of the LADWP city of Los Angeles aqueduct in 1913 diverted large amounts of water and left the Owens Valley with insufficient water to irrigate crops, commercial agriculture in Owens Valley ended. Cattle ranching, which was less dependent on irrigation, survived and grew to become an important economic activity in the area. After acquiring all the agricultural bottomland, the city of Los Angeles began to offer land leases for stock grazing, with strong restrictions on water use. Cattle still graze today on lands located east and west of the Owens River and all along the margins of Bishop Creek.

The Los Angeles Bureau of Power and Light was formed in 1911 to administer the electrical system in the city of Los Angeles that supplied power generated by private companies. In 1922, it purchased SCE's distribution system within the city limits. It expanded further in 1937 by purchasing the Los Angeles Gas and Electric Corporation. In that same year, the Los Angeles Bureau of Power and Light merged with the Bureau of Water Works and Supply to become the LADWP. After more territory swaps were made with SCE, LADWP became the sole electrical service provider for the city of Los Angeles in 1939.

8.11.3.4 Mining and Hydroelectric Development

Although mining was not a large part of the economy in the Bishop Creek area, it was the initial reason for the development of the Bishop Creek Project. The first hydroelectric power generation along Bishop Creek was a small plant operated by the Bishop Light and Power Company that generated power for local use. Discovery of economic minerals in the Tonopah and Goldfield areas of Nevada generated additional needs for electricity to run the mining operations, thus providing the impetus for further hydroelectric development along Bishop Creek (Clerico and Koval 1986; Hill 1994).

When Loren B. Curtis and Charles M. Hobbs arrived in the Tonopah and Goldfield areas in 1904, they immediately recognized that a reliable and inexpensive source of power would be necessary to efficiently run the mining operations and capitalize on the economic potential of the area's resources. Curtis, an engineer, decided that Bishop Creek was the best location to produce hydroelectric power for the mines. Hobbs, a banker and financier, secured financial backing for the Bishop Creek Project. The partners incorporated as the Nevada Power, Mining, and Milling Company (NPM&M) on December 24, 1904. Construction commenced in January 1905 on the first generating plant (Powere Plant No. 4); in September 1905, electricity was delivered to the Goldfield Substation. Since NPM&M had secured contracts for power delivery to the mining companies in Goldfield and Tonopah, there was a ready market for Bishop Creek electricity. The power from Bishop Creek made it possible to mine economically, producing a new mining boom and prosperity in Nevada (Clerico and Koval 1986; Elliott 1984; Hill 1994).

On January 5, 1907, the Nevada-California Power Company (NCP) was incorporated as the successor to NPM&M. That same year, NCP expanded Power Plant No. 4, and purchased the capital stock of Hillside Water Company, which facilitated construction of additional plants along Bishop Creek. In 1908, a fifth operating unit was installed at Powere Plant No. 4 and construction of Power Plant No. 2 finished. Power Plant No. 5 was constructed in 1909, and South Lake was enlarged. This expansion allowed the Bishop Creek facilities to produce more power than the mining operations alone required (Clerico and Koval 1986; Hill 1994).

To expand the market for the excess Bishop Creek power, NCP incorporated the Southern Sierra Power Company (SSP) as a subsidiary in 1911 to service the power needs of southeast California. Shortly after incorporation, construction began on a transmission line to San Bernardino where a steam plant was built. Power Plant No. 3 was completed in 1912, and in 1913, it was expanded substantially, with Bishop Creek Project's capacity increasing to 24,350 kW, when Power Plant No. 6 was completed. This essentially completed what is currently known as the Bishop Creek Project (Clerico and Koval 1986; Hill 1994).

NCP and SSP developed and operated the Bishop Creek power plants as two separate but associated power companies. NCP operated Power Plants No. 2, No. 3 and No. 4, which serviced the Nevada mining districts, while SSP operated Power Plants No. 5 and No. 6, which produced power that was delivered to southern California. Building 102 control station was built in 1916 as a control station was constructed near Power Plant No. 5; by 1913 the station received power from a 55kV line from the Lundy Plant as well as power from Power Plants No. 5 and No. 6. The station consisted of a substation, operators building (Building 102) and worker housing and part of the control station for the SSP Power Plants No. 5 and No. 6. The control station regulated the distribution from this part of the Bishop Creek Project. In 1918, a new, larger control station, was built near Power Plant No. 5 so the two systems developed at Bishop Creek could be permanently interconnected. After the new control substation was completed, Building 102, was used solely as a residence (Diamond and Hicks 1988; Hill 1994).

During the 1920s, the power-generating system was fine-tuned to extract as much power as possible from the existing power plants. Much of the company's resources at this time were used to market energy at the far reaches of the distribution network and to purchase other power companies. During the 1930s, the Great Depression limited development in Bishop Creek, and increased competition from rival companies producing cheaper energy on the Colorado River forced the Bishop Creek Company to withdraw from the Imperial and Coachella Valley markets. The Nevada-California Electric Corporation (NCE), formed as a holding company in 1914 for companies associated with SSP, became an operating company in 1936 when the subsidiary companies were dissolved, and the operating properties transferred to the parent company. In 1941, the company changed its name to California Electric Power Company (later colloquially known as Calectric). The properties of Calectric were acquired by SCE in 1964 through a merger. SCE is the present operator of the Bishop Creek Project. Since 1964, SCE's consolidation of operations and automation of the power plant equipment has resulted in the elimination of many on-site employees. During the 1970s, all the housing units at Power Plants Nos. 2, 3, and 5 were demolished, leaving structures only at Power Plants Nos. 4, and 6, and the control station (near Power Plant No. 5) (Hill 1994).

8.11.3.5 Pack Stations

The Sierra Nevada have long been a home to the packing of goods and people on mules and horses. Native Americans traversed the mountains on foot for centuries, leaving well-developed trails over major mountain passes. Later, mule pack trains served as the primary means of carrying goods under the Spanish and Mexican administrations in what is now the American Southwest (Woolfenden et al. 2007) until the mid-1800s, when non-Hispanic Euroamericans began to take over packing operations.

Throughout the nineteenth century, increasing numbers of settlers either crossed the area to areas farther west or settled in the Owens Valley. Those who stayed in the area worked as cattle ranchers, farmers, miners, and later, public land managers. Pack trains during this period were used by the U.S. Army, immigrants, miners, representatives of such federal agencies as the USGS, commercial enterprises, and recreationists (Woolfenden et al. 2007).

Recreational packing gained steam during the last decades of the nineteenth century, when residents began taking trips to explore their mountainous surroundings. The rise of mountaineering as a recreational activity further fueled local interest in exploration, and ranchers and farmers in the areas began to rent their pack animals and themselves, as guides. By the 1920s, packing had become a profitable business, as ever-increasing numbers of people with automobiles could reach the Sierra Nevada and pursue recreation activities such as fishing, hunting, camping, and skiing. Pack stations continued in popularity throughout the middle of the twentieth century but began to decline after the 1960s, as government contracts ended, and people relied on cars and airplanes to get them to their destinations. Additionally, regulations passed in the 1960s limited the number of livestock that each pack station could run in the INF to 50, which led to a consolidation of pack stations and decrease in operations. By 1990, there were fewer than 50 pack stations operating in the Sierra Nevada, more than an 80 percent reduction from historic highs earlier in the century (Woolfenden et al. 2007).

8.11.3.6 Recreation Residences

Recreation residences have existed within USFS units since the outset of the national forest system in the early 1900s. The Pacific Southwest Region (California and Pacific Islands) specifically has contained 45 to 60 percent of all recreation residences nationwide throughout the history of the USFS. The earliest residences documented in the region date from 1906, and the first survey of recreation residence tracts (RRT) was conducted in 1915 in response to the Occupancy Permits Act (Lux et al. 2000:16–17).

The role of recreation residences within the USFS has a complicated history. In the beginning, the USFS encouraged the development of tracts as a means of generating income through permitting, to protect forest resources, and as a means by which to compete with the newly established NPS. Funding for RRTs was limited and not available until the 1920s. Although arguments existed among USFS staff about whether the development of private recreation residences should be encouraged away from primary recreation spots, so they would not detract from the scenic beauty for all guests to enjoy, many private residences were built on choice lots with scenic views and in prime locations with access to streams, lakes, and trails and easily accessible by existing roads. Cooperative associations for RRTs were encouraged to provide common facilities and services, including infrastructure, docks, boathouses, utilities, and so on (Lux et al. 2000:21–27).

The competition between the NPS and USFS extended beyond RRTs. Public use of the national forests came into question with logging, ranching, and mining. The newly established NPS would not allow those uses within the national parks carved out from national forests. Eventually the USFS leaned toward prioritizing other uses over RRTs in order to further separate themselves from the NPS. RRT development declined during the Great Depression and ceased during World War II. Although recreation residences continued to receive permits through 1968 (when the USFS issued a moratorium against them), various factors combined that led to the steady decline in the permitting of new residences. Among the factors that spelled the demise of the recreation residences program was the fact that USFS permitting fees had not kept up with inflation, and over the decades, the revenue generated did not balance out the cost to maintain the facilities (Dickey et al. 2007a:14, 2007b:14; Lux et al. 2000:30–34).

Writing about the history of both the Inyo and Mono National Forests, Mountain Heritage Associates (2003) provided the following context.

The twentieth century was a time of economic change. The Inyo and Mono National Forests were established in 1907. Grazing and watershed protection, and later recreation, were the primary purposes of both forests. In 1913 the Los Angeles aqueduct was completed. The diversion of water by the aqueduct dried up the Owens Valley wetlands and the ranches that depended on the water supply, forcing people out of the valley or into other occupations. The need for local non-railroad access between towns led to the linkage of wagon roads into a toll road that connected Owens Valley and Bridgeport. This road, known as State Route 23 by 1910, became Interstate Highway 395 since the 1930s. [Mountain Heritage Associates 2003:6]

The scenic beauty of the eastern Sierra Nevada attracted recreation-minded people from the cities and the establishment of mountain resorts at June Lake, Silver Lake, and the Mammoth Lakes Basin, among other places, increased commercial and residential development. Recreation residences began to be established after 1915 when Congressional legislation authorized the Forest Service to issue permits for a fixed term under the "Terminable Permit Act." The largest expansion in residences occurred during the 1920's along with the increase in automobile tourism and a strong economy. The Great Depression of the following decade slowed the recreation residence program and the New Deal shifted the emphasis of Forest Service recreation to public campgrounds in order accommodate the demands for stimulating the economy, providing jobs, and *outdoor recreation opportunities. The extension of the Los Angeles aqueduct to the Mono Basin in the 1930s brought a boom to June Lake but after completion of the aqueduct, local business activity slowed until the initiation of ski tows at Oh! Ridge and Fem Creek boosted the economy. Public interest in recreation burgeoned after World War II. The recreation residence program began to be phased out after it peaked in 1966. A more restrictive policy was created of issuing 10-year nonrenewable permits to many residence owners; at the end of each permit period, the permit holder was required to remove all improvements they had made. Mountain-based recreation has been the primary economic fuel to the eastern Sierra Nevada to the present day. [Mountain Heritage Associates 2003:7]*

8.11.4 Study Approach

SOI qualified personnel conducted background research using a series of research methods. First, a records search was performed to gain an understanding of the known cultural resources within the APE and within a 1-mile radius surrounding the APE. Second, a broader regional context of the area was investigated using existing literature. This information was used to guide identification of archaeological resources and site types. Finally, a pedestrian survey was conducted to ground-truth and record the condition of known archaeological and built environment resources, as well as identify new resources.

The Relicensing Team conducted a search of records and maps on file at SCE archives, the INF, BLM, and the EIC of the California Historical Resources Information System at University of California, Riverside, in 2018, 2019, and 2021. The purpose of this search was to gather existing information regarding previously recorded cultural resources within the APE, and to assess which areas of the APE had been surveyed previously. The records search included all lands within the APE plus a study area extending 1 mile around all Bishop Creek Project features. The study area extended beyond the APE to facilitate the gathering of relevant existing information both within the APE and in the immediate vicinity.

- Background research included review of the following sources.
- Management Plan for the Bishop Creek Hydroelectric Project (White 1989);
- Digital library and archives of the Huntington Library (historical SCE records);
- Engineering periodicals;
- Historic-period USGS topographic maps;
- Interviews with Bishop Creek Project personnel;
- Interviews with local people regarding Parchers Resort/Boat Launch, recreational residence tracts, and the Cardinal Mine;

- Inyo County Tax Assessors office and Public Works Division; and
- SCE archival drawings, facilities records, plans, and photographs.

This archival and secondary research was used to create a development and evaluative context for the historic-period built-environment resources located in the APE. Research focused on the history of resources in the APE, as well as the general thematic development context for the APE, specifically prehistory, ethnography, historic settlement, late nineteenth and early twentieth-century irrigation and hydroelectric development resources; mining operations in the early twentieth century; recreation residences and recreational facility development (specifically on USFS lands); and transportation-related resources (i.e., roads and bridges).

Research revealed that the APE and vicinity are highly sensitive for archeological resources and that many areas within the Bishop Creek Project had already been surveyed. However, research also revealed that some areas within the APE had not been surveyed and that some areas should be resurveyed to meet current professional standards. Tables showing the results of the records search (previously conducted surveys and previously recorded archaeological sites) will be included with the FTR for Archaeology and filed as Confidential with the FLA.

Archaeological surveys were conducted after the 2019 records search. The updated 2021 records search added some 60 resources and revealed a number of conflicts between these recent studies and the results of the 2020 fieldwork. This prompted site visits during the 2021 field season to reconcile these conflicts, as detailed below. The FTR for Archaeology will be included as a Confidential filing with the FLA and will include the results of all of the record searches (2018–2021).

8.11.4.1 Previously Conducted Studies

There have been approximately 130 previous cultural resources studies within the study area. Most of these are surveys conducted on behalf of SCE, either as part of the previous FERC relicensing effort conducted in the mid-1980s, or as part of general maintenance or improvements to energy infrastructure. One of the largest of these latter studies is the 2020–2021 survey of SCE power lines on lands managed by INF (Environmental Intelligence, in progress). Most other surveys in the study area include those conducted by or on behalf of the INF. Caltrans sponsored several surveys along the State Route 168 corridor. With the exception of the 2020–2021 survey by Environmental Intelligence, LLC (EI), which was conducted concurrently with this study, none of these previous surveys provides substantial coverage of the APE within the last 10 years.

Previous archaeological testing efforts within the APE have been relatively few, including those by York (1988) and White (1992).

8.11.4.2 Previously Recorded Archaeological Sites

The records search lists 200 previously recorded archaeological sites within the study area. Of these, 41 are precontact sites, 109 are historic in age, 44 contain both precontact and historic-period components, and 6 are listed as unknown (either because they comprise undated rock features, or because documentation is lacking).

Previously recorded precontact site components primarily include bedrock milling stations, lithic scatters, and midden deposits. A few glass trade beads indicate contact-period occupation. Historic-period site components include debris scatters, both domestic and industrial, and the remains of buildings or structures. Other commonly recorded components include the remains of ditches and other water conveyances, and mining-related features such as prospects, adits, and claims.

As detailed in the FTR for Archaeology, to be filed with the FLA, 57 of these sites were mapped within, or partially within, the current APE, while the remaining 146 were mapped within the study area only. All 57 sites mapped within the APE were ultimately addressed in some way, as detailed in survey results discussion below. Some sites originally mapped within the study area only were ultimately recorded within the APE as a result of the survey, and vice versa.

8.11.4.3 Previously Recorded Built Environment Resources

Located within the Bishop Creek Project APE and study area are numerous historic-period built-environment resources associated with the Project, including the determined-eligible Bishop Creek Hydroelectric Project Historic District (BCHPHD), as well as resources related to the Bishop Creek Irrigation System and stream-gaging system, which overlaps the Bishop Creek Project and portions of which have been incorporated into the hydroelectric system. Other identified resources are associated with the themes of mining, transportation, and recreation. Collectively, these resources comprise the survey population. Since the amount of built environment resources is so numerous, all built environment resources are described in Section 8.11.7 so as not to be overly repetitive.

8.11.5 Survey Methods

The archaeological and built environment inventories were performed to current professional standards, as defined in the SOI Standards for Guidelines for Archaeology and Historic Preservation. Areas within the APE that could not be accessed in a safe manner (e.g., locations with dense vegetation or unsafe slopes) were not included in the survey; these areas are identified on confidential maps which will be filed with the FLA in June 2022.

Surveys occurring on INF lands were conducted under Organic Act permit numbers WMD200467 (HRA), WMD20046 (FW), and WMD19045 (DKA). Archaeological survey conducted on BLM lands was conducted under Cultural Resource Use Permit number CA-18-16, Fieldwork Authorization (FWA) 2020-28 (FW); Bridget Wall, a permitted archaeologist on the BLM FWA, was present for all work conducted on BLM lands.

Archaeological survey occurring on private land was conducted in coordination with SCE personnel. Access to South Lake and Lake Sabrina survey areas was most efficiently accomplished by boat.

Most of the field investigations were conducted between September 23 and November 10, 2020, with follow-up fieldwork taking place between October 20 and October 28, 2021. The 2021 work was necessitated by access limitations encountered in 2020; by the addition of access routes and staging areas to the Bishop Creek Project area; and by corrections to the digitizing of the Project area boundary in areas with free-flowing streams. Another division within SCE contracted EI to conduct an archaeological inventory of transmission line corridors within INF in 2020–2021. Some of these corridors overlapped portions of the Bishop Creek APE. This resulted in a number of conflicts between the results of these concurrent studies, which were resolved during the October 2021 field session.

Although the INF was closed to recreation due to wildfire concerns, boat rental operators at South Lake and Lake Sabrina allowed the Relicensing Team to access the shores of the reservoirs.

8.11.5.1 Archaeological Site Recordation Methods

All previously recorded sites within or adjacent to the Bishop Creek APE were revisited, in some cases if only to verify that they were indeed beyond the APE. Existing site maps were used to verify archaeological features, which were then photographed and mapped via GPS along with temporally diagnostic artifacts. Sketch maps were assessed to determine whether they required updating to reflect current site conditions or more modern recording methods (GPS).

New sites were fully documented following the recordation procedures outlined in Instructions for Recording Historical Resources (OHP 1995), using the appropriate California Department of Parks and Recreation (DPR) forms. The recording of new sites included documentation, photographs, and GPS of all features, artifacts, and site boundaries. Any site disturbance was noted and photographed as appropriate. Isolates were recorded on a project isolate log; per INF, no DPR 523 forms were prepared for isolated finds.

All artifacts identified during the field survey, whether within previously recorded archaeological sites or newly identified sites, were left in place. Photographs were taken of all diagnostic lithic artifacts and a sample of temporally diagnostic historic-period artifacts identified at each site.

8.11.5.2 Built Environment Recordation Methods

As part of the CUL 1 survey, architectural historians conducted field survey of the APE both to verify the presence and current condition of previously recorded resources and to inventory and evaluate the NRHP eligibility of previously unidentified resources. Past surveys—most notably associated with the previous relicensing effort—inventoried and evaluated a variety of built-environment resources within the APE associated with different historical themes, including the development of the hydroelectric project, mining, irrigation, recreation, and transportation. Survey tasks included an inventory all historic-period built-environment resources via photographs and documentation, map their exact locations, ascertain their dates of construction and significant alterations, make recommendations about whether previous evaluations remained accurate, evaluate newly recorded resources, and make recommendations as to potential Bishop Creek Project effects on historic properties within the APE. Additionally, any modern-period (i.e., constructed after 1976) buildings and structures encountered in the field were, photographed and recorded to create an accurate inventory of built-environment resources within the APE.

For multicomponent resources (i.e., where thematically related archaeological and historic-period built-environment resources exist in a specific location), the survey effort included photography and documentation of buildings and structures within the multi-component resource (including some resources outside the APE). Examples of multi-component groupings of resources include the BCHPHD, USFS Recreation Residences Tracts, and Wilshire–Bishop Creek (Cardinal) Mine.

8.11.6 Survey Results-Archaeological Sites

The survey documented 60 previously recorded sites and identified 40 previously unrecorded archaeological sites and 50 archaeological isolates within the APE. In this section, the archaeological sites are organized into three subsections: previously recorded archaeological sites that were not relocated or were relocated outside the APE, previously recorded archaeological sites that were relocated within the APE, and newly identified archaeological sites. The archaeological isolates are not discussed in this DLA, but descriptions will be described in the FTR for Archaeology and filed as Confidential with the FLA.

8.11.6.1 Previously Recorded Archaeological Sites that Were Not Relocated or Were Relocated Outside the APE

Nine previously recorded archaeological sites that were mapped within the APE were either not relocated or were relocated outside the APE during the 2020 and 2021 surveys (Table 8.11-2.). The majority of the location discrepancies resulted from errors during digitization of site boundaries from existing site forms into GIS data.

Table 8.11-2. Previously Recorded Sites Not Relocated or Located Outside APE

Primary No.	Trinomial	FS No.	Age	Description	Date recorded	Land mgr.
P-14-003457	CA-INY-3457/H	05-04-53-0154	M	Outside APE, recorded to update location	9/26/2020	USFS

Primary No.	Trinomial	FS No.	Age	Description	Date recorded	Land mgr.
P-14-003461	CA-INY-3461/H	05-04-53-0158	M	Outside APE, recorded to update location	10/24/2020	USFS
P-14-003465	CA-INY-3465/H	05-04-53-0160	M	Outside APE, not re-recorded	-	USFS
P-14-003472	CA-INY-3472	05-04-53-0170	P	Outside APE, recorded to update location	9/24/2020	Private
P-14-003475	CA-INY-3475	05-04-53-0175	M	Not located, likely outside APE	-	Private
P-14-004499	CA-INY-4499	05-04-53-0582	P	Outside APE, recorded to update location	10/26/2020	BLM
P-14-012777	CA-INY-9677	-	M	Outside APE, not re-recorded	-	Private
P-14-012779	CA-INY-9679	-	H	Outside APE, not re-recorded	-	Private
P-14-012780	CA-INY-9680	-	H	Outside APE, not re-recorded	-	Private

Multiple sites recorded by Macko and White's (1986) crews were relocated outside the APE or were not relocated during the 2020 survey. Sites P-14-003457, P-14-003461, P-14-003465, P-14-003472, and P-14-004499 were relocated outside of the APE. Site P-14-003475 was not located during survey, but a review of the sketch map indicates that it is mis-plotted and outside the APE.

Field crews revisited archaeological sites P-14-012777, P-14-012779, and P-14-012780, each of which appeared to be located adjacent to the APE but did not appear to overlap it. The crew confirmed the accuracy of the site boundary as illustrated on the sketch map in each DPR523 form for these three sites, confirming that they are outside the APE (Newcomb and Millington 2014a, 2014b, 2014c).

Where substantial digitizing errors placing a site outside the APE were confirmed in the field, a site record update was prepared to correct it. In the cases of sites P-14-012777, P-14-012779, and P-14-012780, the correct site plottings have been reported to SCE and INF.

8.11.6.2 Previously Recorded Archaeological Sites Located Within the APE

The survey documented 60 previously recorded archaeological resources within the APE (Table 8.11-3). Updated DR523 documentation was prepared for 36 of these resources as part of this survey. For 22 other sites, no update was prepared because the existing documentation was judged to be adequate or because access issues prevented a revisit; the remaining two sites were judged to be more appropriately addressed in the FTR for Built Environment Resources (Miller and Waldroop in progress). Site locations will be plotted on maps in the FTR for Archaeology and filed as Confidential with the FLA.

Table 8.11-3. Previously Recorded Archaeological Sites within the APE

CA Primary	Trinomial	Agency No.	Temp/field ID	Age	Constituents	District element	Date recorded	Land Mgmt.
P-14-003473	CA-INY-3473H	FS 05-04-53-0172	-	M	Historic-period residence; historic-period water conveyance system	BCHPHD	10/13/2020	Private
P-14-012778	CA-INY-9678	-	-	H	Historic-period hydroelectric; historic-period water conveyance system	BCHPHD	11/5/2020	Private
P-14-003468	CA-INY-3468/H	FS 05-04-53-0165	-	M	Precontact lithic scatter; precontact milling feature; historic-period hydroelectric construction camp; historic-period (possibly Native American) camp	BCHPHD	10/26/2020	BLM/Private
P-14-005771	-	FS 05-04-53-0179	aka P-14-005771/010528	H	Historic-period hydroelectric	BCHPHD		USFS
P-14-010527	-	FS 05-04-53-0178	-	H	Historic-period hydroelectric residential	BCHPHD	11/6/2020	USFS
P-14-005590	CA-INY-5246/H	FS 05-04-53-0177	aka P-14-005590/005599/010526	M	Precontact habitation site; historic-period hydroelectric residential; historic-period debris scatter	BCHPHD	10/21/2021	USFS
P-14-004704	CA-INY-4704H	FS 05-04-53-1374	-	M	Historic-period debris scatter	BCHPHD	(not updated)	USFS

CA Primary	Trinomial	Agency No.	Temp/field ID	Age	Constituents	District element	Date recorded	Land Mgmt.
P-14-004706	CA-INY-4706H	FS 05-04-53-1376	-	H	Historic-period road segment	BCHPHD	11/7/2020	USFS
-	-	-	R1-Site-142	M	Precontact lithic scatter; historic-period foundations; historic-period debris scatter/concentration	BCHPHD	(not updated)	USFS
-	-	-	R1-Site-145	H	Historic-period debris scatter	BCHPHD	10/22/2021	USFS
-	-	-	R1-Site-143	H	Historic-period road segment	BCHPHD	(not updated)	USFS
P-14-010529	-	FS 05-04-53-0171	-	H	Historic-period hydroelectric residential	BCHPHD	11/7/2020	USFS
P-14-002770	CA-INY-2770/H	FS 05-04-53-00127	aka P-14-002770/ P-14-011725	H	Historic-period debris scatter; historic-period recreation	BCHPHD	10/26/2021	USFS
P-14-005741	-		Birch Creek East Flowline	H	Historic-period hydroelectric	BCHPHD	10/26/2021	USFS
P-14-005742	-		Birch Creek East Intake and Diversion	H	Historic-period hydroelectric	BCHPHD	10/26/2021	USFS
-	-	-	R1-Site-2034	H	Historic-period road segment	BCHPHD	10/24/2021	USFS
-	-	-	R1-Site-184	H	Historic-period debris scatter; historic-period foundations/structure pads	BCHPHD	(not updated)	USFS
-	-	-	R1-Site-175	H	Historic-period structure	BCHPHD	(not updated)	USFS
P-14-005800	-	-	South Lake Dam	H	Historic-period hydroelectric	BCHPHD	10/25/2020	USFS

CA Primary	Trinomial	Agency No.	Temp/field ID	Age	Constituents	District element	Date recorded	Land Mgmt.
P-14-003460	CA-INY-3460H	FS 05-04-53-0157	-	H	Historic-period hydroelectric; historic-period logging	BCHPHD	10/8/2020	USFS

8.11.6.3 Newly Identified Archaeological Sites Within the Area of Potential Effects

Survey crews identified 40 new archaeological sites within the APE (Table 8.11-4). Locations will be included in maps for the FTR for Archaeology and filed with the FLA.

Table 8.11-4. Newly Identified Archaeological Sites within the APE

Site No.	Age	Constituents	Date recorded	District element?	Land mgr
BC01	MC	Precontact lithic scatter; historic-period debris scatter/concentration	9/24/2020	-	Private
BC02	MC	Precontact lithic scatter; historic-period debris scatter/concentration	10/15/2020	-	Private
BC03	P	Precontact lithic scatter	9/24/2020	-	Private
BC04	H	Water conveyance system	11/10/2020	-	Private
BC06	MC	Precontact lithic scatter; precontact milling feature; historic-period hydroelectric (possible construction camp)	9/28/2020	BCHPHD	Private
BC07	H	Historic-period debris scatter	10/29/2020	BCHPHD	BLM
BC08	H	Historic-period transportation	10/29/2020	BCHPHD	BLM
BC09	P	Precontact milling feature	9/27/2020	-	BLM
BC10	H	Water conveyance system	10/29/2020	-	BLM/ Private
BC11	MC	Precontact lithic scatter; precontact habitation; historic-period hydroelectric (possible construction camp)	10/29/2020	BCHPHD	BLM
BC12	H	Historic-period mining	10/8/2020	-	BLM
BC59	H	Historic-period hydroelectric	10/24/2021	BCHPHD	USFS
BC60	H	Historic-period hydroelectric	10/24/2021	BCHPHD	USFS
BC13	H	Historic-period hydroelectric	11/8/2020	BCHPHD	USFS
BC14	H	Historic-period hydroelectric	11/8/2020	BCHPHD	USFS
BC15	H	Historic-period transmission line	9/27/2020	-	USFS

Site No.	Age	Constituents	Date recorded	District element?	Land mgr
BC16	MC	Precontact milling feature; precontact rock feature; historic-period debris scatter	10/28/2020	-	USFS
BC17	H	Historic-period (Native American) arborglyph	10/27/2020	-	USFS
BC18	H	Historic-period (Euroamerican?) arborglyph; historic-period hydroelectric	10/27/2020	BCHPHD	USFS
BC19	H	Historic-period hydroelectric; historic-period (Euroamerican) arborglyph	10/27/2020	BCHPHD	USFS
BC20	H	Historic-period hydroelectric; historic-period irrigation	10/27/2020	BCHPHD	USFS
BC22	H	Historic-period (Native American) arborglyph	10/12/2020	-	USFS
BC23	H	Historic-period debris scatter	10/27/2020	-	USFS
BC24	H	Historic-period (Native American) arborglyph	10/12/2020	-	USFS
BC27	H	Historic-period recreation residence site	10/24/2020	LSRRT	USFS
BC28	H	Historic-period recreation; historic-period debris concentration	11/6/2020	-	USFS
BC33	H	Historic-period recreation	11/4/2020	-	USFS
BC35	H	Historic-period recreation residence site	11/4/2020	LSRRT	USFS
BC36	H	Historic-period recreation residence site	10/10/2020	LSRRT	USFS
BC37	H	Historic-period hydroelectric; historic-period residential	10/9/2020	BCHPHD	USFS
BC43	H	Historic-period (Basque) arborglyph	9/26/2020	-	USFS
BC45	H	Historic-period recreation debris scatter (likely fishing)	11/6/2020	-	USFS

Site No.	Age	Constituents	Date recorded	District element?	Land mgr
BC46	H	Historic-period (Euroamerican) arborglyph; historic-period debris scatter	10/10/2020	-	USFS
BC47	H	Historic-period (Basque) arborglyph	11/6/2020	-	USFS
BC48	H	Historic-period (Native American) arborglyph	10/10/2020	-	USFS
BC49	H	Historic-period arborglyph	10/9/2020	-	USFS
BC50	H	Historic-period mining	10/9/2020	-	USFS
BC51	H	Historic-period road	10/9/2020	BCHPHD	USFS
BC52	H	Historic-period residence/historic-period recreation	10/24/2020	-	USFS
BC57	H	Historic-period recreation/camp site	10/14/2020	-	USFS

8.11.6.4 Existing Historic Districts That Include Archaeological Sites

Several of the archaeological resources discussed in the preceding sections are associated with existing or potential historic districts that overlap the APE. The BCHPHD (P-14-004825) and the Wilshire-Bishop Creek (Cardinal) Mine (P-14-002529) were first documented as cultural resources in the 1980s. They each contain both built environment and archaeological resources. In 2004 and 2005, the NPS conducted an intensive built environment survey of the Lake Sabrina Recreation Residence Tract Historic District (05-04-53-001723) (Dickey et al. 2005). Archaeological resources identified during the current survey are associated, or potentially associated, with each district. The archaeological sites associated with each district are discussed in the FTR for Archaeology, to be filed with the FLA.

8.11.6.5 Bishop Creek Hydroelectric Project Historic District (BCHPHD [P-14-004825])

The BCHPHD (P-14-004825) was first documented by Clerico and Koval (1986). The evaluation of the district was updated by Diamond and colleagues (1988). The Bishop Creek Project is intact and is an early example of a high-head, impulse waterwheel, and high-voltage electric generation project. The Bishop Creek Project was determined eligible (by consensus) for listing in the NRHP under Criteria A and C, with a period of significance of 1905 to 1938 (OHP Letter dated September 7, 1988) The Cultural Resources Built Environment Technical Study Report will include a discussion on the historic context of the district and discussions of the district boundaries and built environment resources documented within.

In 1986, archaeologists associated multiple historic-period archaeological sites with the BCHPHD (P-14-004825) and evaluated those sites as either contributing or noncontributing resources to the district. However, it appears that those recommendations were not incorporated into the official district record at that time (Diamond et al. 1988). More recently, archaeologists noted the association of additional archaeological sites with the Bishop Creek Project but did not evaluate them as contributing or noncontributing resources to the BCHPHD (P-14-004825).

The crew revisited several previously recorded archaeological sites that are resources within the district. The crew identified new archaeological sites associated with the district. Table 8.11-5 compiles the previously recorded sites that were associated with the district and newly identified archaeological sites which may be associated with the district.

Table 8.11-5. Selection of Archaeological Resources Associated or Potentially Associated with the BCHPHD (P-14-004825)

Primary	Trinomial	Agency/ Temporary Number	Description	NRHP Status	Associated with the BCHPHD?	Recommended Status within the BCHPHD	Within APE?
P-14-002770/ P-14-011725	CA-INY-2770/H/ CA-INY-9019H	05-04-53-00127/ 05-04-53-02293	Historic-period debris scatter and hunting blind	Unevaluated	Yes	Unevaluated	Yes
P-14-003460	CA-INY-3460H	05-04-53-0157	Remnants of possible logging camp	Not eligible	Yes	Contributing	Yes
P-14-003468	CA-INY-3468/H	05-04-53-0165/ 05-04-53-0166	Remnants of construction camp	Not eligible	Yes	Unevaluated	Yes
P-14-003469	CA-INY-3469H	05-04-53-0167	Artifact concentration and rock alignments	Not eligible	Yes	Unevaluated	No
P-14-003473	CA-INY-3473	05-04-53-0172	Cashbaugh/ Kilpatrick Site	Eligible	Yes	Unevaluated	Yes
P-14-004704	—	—	Twentieth-century debris scatter	Unevaluated	Potentially	Unevaluated	Yes
P-14-004706	—	—	Abandoned segments of County Road (Old Highway 168)	Unevaluated	Yes	Unevaluated	Yes

Primary	Trinomial	Agency/ Temporary Number	Description	NRHP Status	Associated with the BCHPHD?	Recommended Status within the BCHPHD	Within APE?
P-14-005590/ P14-005599/ P-14-010526	CA-INY-5246/H	05-04-53-0177	Historic-period debris scatters, and remnants of SCE workers' orchard; precontact habitation site	Historic-period component unevaluated; Precontact component recommended eligible	Yes	Unevaluated	Yes
P-14-005741	—	—	Birch Creek East Flowline (in ruin)	Contributing element of BCHPHD	Yes	Contributing	No
P-14-005742	—	—	Birch Creek East Intake and Diversion (in ruin)	Contributing element of BCHPHD	Yes	Contributing	No
P-14-005800	—	—	Ruins on back side of Hillside (South Lake) Dam	Contributing element of BCHPHD	Yes	Contributing	Yes
P-14-010525	—	05-04-53-0176	Foundations of first hydroelectric facility along Bishop Creek	Contributing element of BCHPHD	Yes	Contributing	No
P-14-010527	—	05-04-53-0178	Power Plant 3 apartment ruins	Not eligible	Yes	Noncontributing	Yes
P-14-010529	—	05-04-53-0171	Former chicken coops and terraces associated with residences at Power Plant 2	Not eligible	Yes	Noncontributing	Yes

Primary	Trinomial	Agency/ Temporary Number	Description	NRHP Status	Associated with the BCHPHD?	Recommended Status within the BCHPHD	Within APE?
P-14-012777	CA-INY-9677	—	Historic-period dump and precontact lithic scatter	Unevaluated	Potentially	Unevaluated	No
P-14-012778	CA-INY-9678/H	—	Water conveyance system and trash dump	Unevaluated	Yes	Unevaluated	Yes
P-14-012779	CA-INY-9679	—	Artifact scatter	Unevaluated	Potentially	Unevaluated	No
P-14-012780	CA-INY-9680	—	Artifact concentration/ scatter and pit	Unevaluated	Potentially	Unevaluated	No
—	—	05-04-53-0183	Watchman’s cabin	Not Eligible	Yes	Unevaluated	No
—	—	BC06	Mixed industrial/domestic debris	Unevaluated	Yes	Unevaluated	Yes
—	—	BC08	Abandoned road alignment	Unevaluated	Yes	Unevaluated	Yes
—	—	BC11	Possible construction camp	Unevaluated	Yes	Unevaluated	Yes
—	—	BC13	Wood stave pipe remnants	Unevaluated	Yes	Noncontributing	Yes
—	—	BC14	Wood stave pipe remnants	Unevaluated	Yes	Noncontributing	Yes
—	—	BC18	Gated weir (in ruin)	Unevaluated	Yes	Unevaluated	Yes
—	—	BC19	Water conveyance system ruins	Unevaluated	Potentially	Unevaluated	Yes
—	—	BC20	Water control feature	Unevaluated	Potentially	Unevaluated	Yes
—	—	BC37	Lake Sabrina Dam Operator’s Cabin Complex	Unevaluated	Yes	Unevaluated	Yes

Primary	Trinomial	Agency/ Temporary Number	Description	NRHP Status	Associated with the BCHPHD?	Recommended Status within the BCHPHD	Within APE?
—	—	BC51	Abandoned stretch of South Lake Road	Recommended eligible as component of BCHPHD	Yes	Contributing	Yes
—	—	BC59	Water conveyance system	Recommended eligible as component of BCHPHD	Yes	Contributing	Yes
—	—	BC60	Water conveyance system	Recommended eligible as component of BCHPHD	Yes	Contributing	Yes
—	—	R1-Site-142	Precontact lithic scatter; historic-period rock alignments/structures; historic-period debris scatter	Recommended eligible as component of BCHPHD	Yes	Contributing	Yes
—	—	R1-Site-143	Abandoned road segment	Unevaluated	Yes	Unevaluated	Yes
—	—	R1-Site-145	Historic-period debris scatter; historic-period feature	Unevaluated	Yes	Unevaluated	Yes
—	—	R1-Site-158	Abandoned segment of County Road (Old Highway 168)	Unevaluated	Yes	Unevaluated	No
—	—	R1-Site-159	Abandoned segment of County Road (Old Highway 168)	Unevaluated	Yes	Unevaluated	No

Primary	Trinomial	Agency/ Temporary Number	Description	NRHP Status	Associated with the BCHPHD?	Recommended Status within the BCHPHD	Within APE?
—	—	R1-Site-175	Rock wall	Unevaluated	Potentially	Unevaluated	Yes
—	—	R1-Site-184	Rock retaining wall, graded pad, artifact scatter	Unevaluated	Potentially	Unevaluated	Yes
—	—	R1-Site-2034	Abandoned segments of County Road (Old Highway 168)	Unevaluated	Yes	Unevaluated	Yes

8.11.6.6 Wilshire-Bishop Creek (Cardinal) Mine/ Cardinal Village Resort Historic District (P-14-002529)

The Wilshire-Bishop Creek (Cardinal) Mine (P-14-002529) was first recorded as a cultural resource in 1982. At the time, it was recorded on an archaeological site form, with several Continuation Sheets and Building Data Sheets attached. In total, 36 archaeological features and 16 built environment resources were documented during the initial inventory of the mine (Zeier et al. 1982a). The California SHPO concurred that the mine was eligible for listing in the NRHP in a letter dated June 7, 1983 (Ref: FERC830428B). Significant periods within the mine's history were defined as the Wilshire era (1906–1933) and the Cardinal Mine era (Cardinal era, 1933–1938). In 2020, the crew officially redefined the resource as a historic district.

The Wilshire-Bishop Creek (Cardinal) Mine (P-14-002529) was already determined eligible for listing in the NRHP. Due to the existing eligibility determination, safety concerns at the creek crossing, and the extensive nature of the historic district, archaeologists limited their efforts during the 2020 fieldwork phase to a brief reconnaissance survey along the trail southeast of Bishop Creek. They relocated several archaeological features documented in the original site form (Zeier et al. 1982a). The resources observed in 2020 appeared to be in similar condition to when they were first documented.

8.11.6.7 Lake Sabrina Recreation Residence Tract Historic District (FS No. 05-04-53-001723)

In 2000, the National Forest Service determined their Strategy for the Inventory and Historic Evaluation of Recreation Residence Tracts in the National Forests of California from 1906 to 1959 (Lux et al. 2000). This guide gives preference to extant buildings and requires a recreation residence tract to meet both Criteria A and C to be eligible for listing in the NRHP. The NPS conducted an intensive survey of the eight extant cabins and their associated outbuildings on the Lake Sabrina Recreation Residence Tract in 2005. They classified the Lake Sabrina Tract as a District and evaluated the extant buildings and structures as contributors or noncontributors to the Lake Sabrina Tract. The period of significance for the tract is 1936–1959 (Dickey et al. 2005, 2007a). No evidence that the California SHPO reviewed these findings has been identified. The record documenting the survey notes, "Six lots in the Lake Sabrina Tract (3, 6, 7, 9. 10, 11) were retired in 1983 to make room for higher-use public recreation," but makes no further mention of the retired lots (Dickey et al., 2005:2).

During the cultural resources inventory conducted for the Bishop Creek Project in 2020, an architectural historian revisited the extant cabins and associated outbuildings within the Lake Sabrina Recreation Residence Tract Historic District (refer to Miller and Waldroop in progress for descriptions of each built environment resource). Archaeologists on the survey identified the ruins of six cabins and associated structures at three sites associated with the retired lots in the Lake Sabrina Recreation Residence Tract. The archaeologists recorded them as archaeological sites BC27, BC35, and BC36. Though the archaeological resources will make minimal contributions to the integrity levels and scores for individual residences (following the McNeil ratings method, as described in Lux et al. 2000), analysis of the sites may provide information about the cultural landscape of the tract more broadly. The archaeological resources are described in Table 8.11-6.

Focused on the extant cabins and associated structures, the NPS defined “two distinct locations” associated with the tract. The northern location contains Lots 20 and 21. The remaining extant buildings and structures are located approximately 1 mile southwest of Lots 20 and 21 (Dickey et al., 2007a:13). GIS data obtained from INF delineates five distinct locations: one for Lots 20 and 21 in the north and four associated with lots grouped along Middle Fork Bishop Creek between the Cardinal Mine Resort and Lake Sabrina. Incorporating the archaeological resources into the District required expansions of two of the southern loci delineated by the INF.

Table 8.11-6. Newly Identified Archaeological Resources Associated with the Lake Sabrina Recreation Residence Tract Historic District (05-04-53-001723)

Primary	USFS Number	Temporary Number	Lots	Description
—	—	BC27	10 and 11	Ruins of two cabins and six associated structures
—	—	BC35	6 and 9	Ruins of two cabins and associated structures
—	—	BC36	Unnumbered Lot(s) northeast of Lot 1	Ruins of two cabins and associated structures

Several of the archaeological resources discussed in the preceding sections are associated with existing or potential historic districts that overlap the APE. The BCHPHD(P-14-004825) and the Wilshire-Bishop Creek (Cardinal) Mine (P-14-002529) were first documented as cultural resources in the 1980s. They each contain both built environment and archaeological resources. In 2004 and 2005, the NPS conducted intensive built environment surveys of the Lake Sabrina Tract Recreation Residences Historic District (05-04-53-001723) and the South Fork Bishop Recreation Residence Tract Historic District (P-14-000861) (Dickey et al. 2005; 2007a). Archaeological resources identified during the 2020 fieldwork are associated, or potentially associated, with each district. Finally, the irrigation network that took water from Bishop Creek to water the lower lands just west of Bishop are related to both Paiute and non-American Indian activities. It is possible that irrigation ditches recorded within the APE may be viewed as elements of a potential historic district. Each district and the potential district are discussed in the subsections below.

8.11.7 Survey Results-Built Environment Resources

8.11.7.1 Hydroelectric Related Facilities in the BCHPHD

During the previous relicensing effort, SCE evaluated the Bishop Creek Project for its NRHP eligibility. The Bishop Creek Project consists of 12 dams/diversions and 5 power plants each containing a set of independent, high-head, impulse waterwheel, and electrical power-generating subsystems established at various elevations along Bishop Creek on the eastern slope of the Sierra Nevada Mountains. The power plants are connected by a complex system of flowlines, penstocks, and free-flowing sections of different watercourses. The Bishop Creek Project is significant for its position in the expansion of hydroelectric generation technology, its role in the development of eastern California, and the development of transmission electrical power across long distances. The Bishop Creek Project is intact and is an early example of a high-head, impulse waterwheel, and high-voltage electric generation project.

As a result of studies performed during the previous relicensing (primarily Diamond et al. 1988 and Clerico and Koval 1986), the BCHPHD was recommended and determined eligible by consensus for listing in the NRHP under Criteria A and C, with a period of significance of 1905 to 1938 (OHP Letter dated September 7, 1988). Diamond et al. (1988) created historic resources inventory (HRI) forms for the historic district and each contributing resource. The BCHPHD was assigned California state primary number 14-004825, and the documented 68 contributing resources also received primary numbers. Diamond and colleagues (1988) did not document on HRA forms the 25 resources they recommended to be noncontributing; and thus, those resources did not receive primary numbers. Since 1988, others have created DPRs for some of the contributing elements as well as for newly identified contributing and noncontributing elements.

Urbana has been conducting separate, concurrent studies for SCE, including documentation and evaluation of transmission lines and roads associated with the BCHPHD (Urbana 2019, 2020, 2021). The results of the Urbana studies are incorporated into this DLA where appropriate. The following numbers and types of resources associated with the BCHPHD were found (Table 8.11-7Table):

- Contributing = 69
- Noncontributing = 52
- Demolished (since 1988) = 9

Additionally, two resources that originally contributed to the BCHPHD as built-environment resources have been decommissioned and are in ruin (Birch Creek East diversion and intake and Birch Creek East flowline) and have been converted to contributing archaeological sites (Pickrell et al. 2022); one resource remains unevaluated because it is outside the APE and built outside the historic period defined for this study (SCE Gaging Station 321); and four have been noted but not recorded (2 within the APE: an incinerator cone and a rock wall storage structure at Plant 4 for which no information can be found; and outside the APE: a weather station at South Lake and a weather station at Lake Sabrina).

Of the 52 noncontributing resources within the BCHPHD, 18 have not yet achieved 45 years of age and are determined not eligible/noncontributing based on age; no further evaluation was conducted for these resources (Table 8.11-7).

8.11.7.2 Transmission Lines in the Bishop Creek Hydroelectric PHD

Several transmission lines are included in the survey population for the BCHPHD as they intersect the APE or are associated with the BCHPHD. As stated above, these resources were recently documented and evaluated and did not need to be updated for this study.

Of the transmission lines included in the survey, three are recommended as contributing resources within the BCHPHD, one of which is also individually eligible for listing in the NRHP.

8.11.7.3 Roads in the BCHPHD

Several roads are included in the survey population for the BCHPHD as they either cross the APE or are associated with the BCHPHD. These include access roads to transmission lines leading from the control station, an access road along the Abelour (Powers) ditch, and roads between power plants within the BCHPHD. Additionally, a section of Old Highway 168 and two county roads (South Lake Road and Lake Sabrina Road) were included for their association with the early history of the region as well as their association with the BCHPHD.

A portion of the Access Road to SCE Bishop Creek–San Bernardino "Tower Line" was included within the BCHPHD. Based on Urbana’s (2021) documentation, a small segment of the access road near Power Plant No. 5 appears to be within the proposed FERC boundary. However, upon inspection of the 1949 USGS topographical map, that small segment of the access road is not from the historic period. Therefore, only the portion of the access road from the historic period within the BCHPHD is included. This segment runs farther north and crosses Bishop Creek near Power Plant No.6. Only a few hundred feet of the approximately 238 miles of the access road are included within the proposed FERC boundary; however, the portion of the access road between the control station and the Tungsten Mine contributes to the BCHPHD.

Table 8.11-7. Bishop Creek Hydroelectric Project Historic District Resources

Primary Number	FS Number	Temporary Number	Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
14-004825	05-04-53-02311		BCHPHD		Period of Significance 1905–1938	Historic District, Criterion A and C		Historic District, Criterion A and C
14-005751			Green Creek Diversion and Intake	Green Creek	Prior to 1925 (plans dated 1919)	Contributing	Yes	Contributing
14-005750			Green Creek Flowline	Green Creek	Prior to 1925 (plans dated 1919), 1936, 1956	Contributing	Yes	Contributing
14-005800			Hillside (South Lake) Dam (complex)	South Lake (Hillside Reservoir)	1890s, 1910–1911, ca. 1925, 2011, 2012	Contributing	Yes	Contributing
14-005799			Weir Lake Weir and Gaging Station	South Fork Diversion / Weir Lake	ca. 1922	Contributing	Yes	Contributing
14-005798			South Fork Diversion (complex)	South Fork Diversion	1908, 1950, 1951, 1965, 1985	Contributing	Yes	Contributing
		SCE308	SCE Gaging Station 308	Intake No. 2 (at Forks Campground)	1965, 2009	n/a	Yes	Not Individually Eligible / Noncontributing
			SCE Gaging Station 322	South Fork Diversion	1994	n/a	Yes	Not Individually Eligible / Noncontributing
14-005753			Lake Sabrina Dam	Lake Sabrina	1909–1910, 1916–1917, 2006	Contributing	Yes	Contributing
14-005755			Lake Sabrina Dam Valve House	Lake Sabrina	1909, 1930, 2010	Contributing	Yes	Contributing
14-005754			Lake Sabrina Weir and Gaging Station	Lake Sabrina, Middle Fork Bishop Creek	ca. 1922	Contributing	Yes	Contributing
14-005756			Longley Dam	Longley Lake	1909, 1934	Contributing	Yes	Contributing
14-005758			McGee Creek Diversion and Intake	McGee Creek	1919, 1955	Contributing	Yes	Contributing
			SCE Gaging Station 321	McGee Creek	1994	n/a	No	Unevaluated
14-005757			McGee Creek Flowline	McGee Creek	1919, 1920, 1926, 1955, 1984	Contributing	Yes	Contributing
14-005744			Birch McGee Diversion and Intake	Birch McGee Creek	1919, 1950, 1984	Contributing	Yes	Contributing
			SCE Gaging Station 320	Birch McGee Creek	1994	n/a	Yes	Not Individually Eligible / Noncontributing
14-005743			Birch McGee Flowline	Birch McGee Creek	1919, 1933, 1934, 1949, 1983	Contributing	Yes	Contributing
14-005742			Birch Creek East Diversion and Intake	n/a	1919, 1950 (decommissioned in 1996)	Contributing	No	Refer to Pickrell et al. 2022
14-005741			Birch Creek East, Flowline	n/a	1919, 1934 (decommissioned in 1996)	Contributing	No	Refer to Pickrell et al. 2022
14-005752			Intake No. 2 (complex)	Intake No. 2	1908–1909, 1924, 1983–1984, ca. 2008, 2019	Contributing	Yes	Contributing
14-005761			Flowline No. 2	Plant 2	1908, 1949, 1951, 1952, 1955, 1991	Contributing	Yes	Contributing
14-005760			Penstock No. 2	Plant 2	1908	Contributing	Yes	Contributing
14-005768			Power Plant No. 2	Plant 2	1908, 1927	Contributing	Yes	Contributing
14-005769			Power Plant No. 2 Transformer House	Plant 2	1908, 1927–1928	Contributing	Yes	Contributing
14-005777			Power Plant 2, Shed	Plant 2	1910	Contributing	Yes	Contributing
		LW-16	Power Plant 2, Garage	Plant 2	1908–1925	Noncontributing	Yes	Noncontributing
		HLM-9b	Power Plant 2, Rock Wall System	Plant 2	ca. 1908	n/a	Yes	Noncontributing

Primary Number	FS Number	Temporary Number	Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
14-005767			Intake No. 3	Plant 2	1912–1913, 1983, ca. 2008	Contributing	Yes	Contributing
14-005736			Flowline No. 3	Plant 2	1912–1913, 1953, 1958, 1959–1960, 1973, 1983, 1994, ca. 2009	Contributing	Yes	Contributing
			SCE Gaging Station 323	Plant 2	1994, 2015	n/a	Yes	Not Individually Eligible / Noncontributing
14-005762			Penstock No. 3	Plant 3	1912–1913	Contributing	Yes	Contributing
14-005772			Power Plant No. 3	Plant 3	1913, 1954	Contributing	Yes	Contributing
14-005773			Power Plant No. 3, Battery House	Plant 3	1913, ca. 1922, 1939	Contributing	Yes	Contributing
		HLM-10b	Power Plant 3, Rock Wall System	Plant 3	ca. 1913	n/a	Yes	Noncontributing
14-005770			Intake No. 4	Plant 3	1912, 1966, 1987, 2005, 2008, 2017	Contributing	Yes	Contributing
14-005771	05-04-53-179		St[r]eam Gaging Station (Old Dam No. 4)	Plant 3	1905, 1912 (dam abandoned), 1994, 2012	Contributing	Yes	Contributing
14-005737			Flowline No. 4	Plant 3	1905, 1916–1917, 1956, 1967–1968	Contributing	Yes	Contributing
14-005763			Penstock No. 4	Plant 4	1905, 1909, 1913, 1951, 1953	Contributing	Yes	Contributing
14-005789			Power Plant No. 4	Plant 4	1904–1905, 1913–1928, 1965	Contributing	Yes	Contributing
14-005735			Cottage 1 (Building 102)	Plant 4	1909	Contributing	N/A	Demolished
14-005759			Cottage 30 (Building 103)	Plant 4	1909, 1938, 1950, 1954, 1960	Contributing	Yes	Contributing
		HLM-14l (possibly 14-005774 but mislabeled in Diamond et al. 1988 as a duplicate 14-005773)	Cottage 21 (Building 114)	Plant 4	1927, 1966	Contributing	Yes	Contributing
14-005775			Cottage 22 (Building 115)	Plant 4	1928	Contributing	Yes	Contributing
14-005778			Cottage 24 (Building 117)	Plant 4	1928, 1932 (moved to current site), 1965	Contributing	Yes	Contributing
14-005776			Cottage 23 (Building 116)	Plant 4	Prior to 1928, 1966	Contributing	Yes	Contributing
		HLM-11b	Shed / Garage (Building 108/118)	Plant 4	1927 / 1917	Noncontributing	Yes	Noncontributing
		HLM-11c	Storage/Garage (Building 119)	Plant 4	1931, 1950s (moved to current site)	Noncontributing	Yes	Noncontributing
14-005779			Cottage 28 (Building 121)	Plant 4	ca. 1928–1930, 1968	Contributing	Yes	Contributing
14-005780			Cottage 29 (Building 122)	Plant 4	ca. 1928–1930	Contributing	N/A	Demolished
		HLM-11d	Blacksmith Shop (Building 124)	Plant 4	1931, 1951 (moved to current site)	Noncontributing	Yes	Noncontributing
14-005781			Vault / Lightning Arrester Building (Building 125)	Plant 4	1907	Contributing	Yes	Contributing
14-005782			Transformer Vault / Meter House (Building 126)	Plant 4	ca. 1907	Contributing	Yes	Contributing
14-005783			Valve House (Building 127)	Plant 4	1907	Contributing	Yes	Contributing
14-005784			Fire Hydrant House (Building 128)	Plant 4	1929	Contributing	Yes	Contributing
		HLM-11e	Shop (Building 129)	Plant 4	1951	Noncontributing	Yes	Not Individually Eligible / Noncontributing
14-005785			Garage (Stave Warehouse) (Building 130)	Plant 4	ca. 1900	Contributing	Yes	Contributing

Primary Number	FS Number	Temporary Number	Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
		HLM-11f	Garage (Building 131)	Plant 4	1951	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11g	Cement/Lumber Warehouse (Building 132)	Plant 4	1952	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11h	Construction Office (Building 107/133)	Plant 4	1907	Noncontributing	Yes	Noncontributing
		HLM-11i	Shed and Equipment Building (Building 134)	Plant 4	1953	Noncontributing	Yes	Not Individually Eligible / Noncontributing
14-005786			Shed / Stave Warehouse (Building 135)	Plant 4	ca. 1910	Contributing	Yes	Contributing
		HLM-11j	Garage (Building 137)	Plant 4	1954	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11k	Garage (Building 138)	Plant 4	1954	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11l	Tool Shed (Building 141)	Plant 4	1955	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11m	Garage (Building 142)	Plant 4	1955	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11n	Storage / Loading Dock (Building 145)	Plant 4	1951	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11o	Garage (Building 146)	Plant 4	1952	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11p	Garage (Building 148)	Plant 4	1957	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		HLM-11q	Office (Building 149)	Plant 4	1959	Noncontributing	Yes	Not Individually Eligible / Noncontributing
		LW-1	Garage (Building 150)	Plant 4	Ca. 1950s–1980s	n/a	Yes	Not Individually Eligible / Noncontributing
			Carpenter Shop (Building 152)	Plant 4	1980s	Noncontributing	Yes	Not Individually Eligible / Noncontributing
			Fire Hose House (Building 44)	Plant 4	After 1938	Noncontributing	N/A	Demolished
14-005787			Landscape Features, Rock Walls, and Lighting Standards	Plant 4	1907–1925	Contributing	Yes	Contributing
14-005790			Cottage 3 (Building 104)	Plant 4	1909	Contributing	Yes	Demolished
14-005791			Cottage 4 (Building 105)	Plant 4	1909	Contributing	Yes	Contributing
14-005792			Cottage 7 (Building 106)	Plant 4	1908	Contributing	Yes	Contributing
			Water Tanks 1 & 2	Plant 4	Modern	n/a	Yes	Not Individually Eligible / Noncontributing
14-005793			Recreation Hall (Building 109)	Plant 4	1907	Contributing	Yes	Contributing
14-005794			Cottage 20 (Building 113)	Plant 4	1927	Contributing	Yes	Demolished
14-005788			Intake No. 5	Plant 4	1907, 1909	Contributing	Yes	Contributing
			SCE Gaging Station 325	Plant 4	1994, 2018	n/a	Yes	Not Individually Eligible / Noncontributing
14-005801			Flowline No. 5	Plant 4 (start point)	1907, 1925, 1949, 1954, 1957	Contributing	Yes	Contributing

Primary Number	FS Number	Temporary Number	Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
14-005764			Penstock No. 5	Plant 5	1907, 1919, 1964	Contributing	Yes	Contributing
14-005739			Power Plant No. 5	Plant 5	1907, 1919	Contributing	Yes	Contributing
			Power Plant 5, Bypass Valve House	Plant 5	ca.1985–1993	n/a	Yes	Not Individually Eligible / Noncontributing
		HLM-12c	Rock walls at Power Plant 5 (used to be associated with Cottages 1 and 2)	Plant 5	ca. 1907	n/a	Yes	Noncontributing
14-005766			Intake No. 6	Plant 5	1913	Contributing	Yes	Contributing
		HLM-13i	Intake No. 6 Gaging Station or utility building (Building 106) (at Power Plant No. 5)	Plant 5	1994?	n/a	Yes	Not Individually Eligible / Noncontributing
14-005734			Cottage 1 (Building 102)	Control Station	ca. 1912	Contributing	Yes	Contributing
14-004745		Should likely be 14-005745 but mislabeled in Diamond et al. 1988 as a 14-004745)	Operations Building (Building 101)	Control Station	1919	Contributing	No	Contributing
14-005747			Cottage 7 (Building 106)	Control Station	1927	Contributing	Yes	Contributing
14-005748			Cottage 9 (Building 108)	Control Station	1931, 1970	Contributing	Yes	Contributing
		LW-17	Plant 6, Rock Wall System	Plant 6	1913	n/a	Yes	Noncontributing
			Garage (associated with Building 102)	Control Station	After 1988	n/a	Yes	Not Individually Eligible / Noncontributing
14-005746			Cottage 2 (Building 103)	Control Station	1916	Contributing	N/A	Demolished
		LW-2 / GS301	Abelour Ditch	Plants 5/6	1885, 1912, 1913, 1920, 1951	n/a	Yes	Contributing
14-005740			Flowline No. 6	Plant 5 (start point)	1913	Contributing	Yes	Contributing
14-005765			Penstock No. 6	Plant 6	1913	Contributing	Yes	Contributing
14-005738			Transformer House / Meter House (SCE Gaging Station 313)	Plants 5/6	ca. 1913/1914	Contributing	Yes	Contributing
		HLM-13h	Electric Supply Station	Between Plants 5/6	ca. 1913	n/a	Yes	Noncontributing
14-005795			Power Plant No. 6	Plant 6	1913, 1938	Contributing	Yes	Contributing
14-005797			Utility Building / Meter House (SCE Gaging Station 302)	Plant 6	ca. 1913/1914	Contributing	Yes	Contributing
			Garage (associated with Building 106)	Control Station	After 1988	n/a	Yes	Not Individually Eligible / Noncontributing
			Metal barn/shed (associated with Building 106)	Control Station	ca. 1985–1993	n/a	No	Not Individually Eligible / Noncontributing
			Garage (Building 109)	Control Station	ca. 1984	Noncontributing	No	Noncontributing
14-005749			Cottage 13 (Building 111)	Control Station	1916–1925, 1942, 1987	Contributing	N/A	Demolished
			Water Tank	Control Station	ca. 1985–1993	n/a	No	Not Individually Eligible / Noncontributing
			Three-Sided Shed	Control Station	ca. 1985–1993	n/a	No	Not Individually Eligible / Noncontributing

Primary Number	FS Number	Temporary Number	Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
			Telecom Building	Control Station	ca. 1993 and 1999	n/a	No	Not Individually Eligible / Noncontributing
			Garage (Building 105)	Control Station	1920, probable complete rebuild in 1993	Noncontributing	No	Not Individually Eligible / Noncontributing
			Guard Shack	Control Station	ca. 1993 and 1999	n/a	No	Not Individually Eligible / Noncontributing
14-005796			Cashbaugh Residence	Plant 6	Late 1860s, 1924, 1952	Contributing	N/A	Demolished
			Garage (Building 105)	Plant 6	1860s; rebuilt 1974	Noncontributing	N/A	Demolished
		SCE TLRR Survey No. 10	Casa Diablo–Control 115kV TL	Control Station	1908-1913, 1965?	n/a	Yes	Noncontributing
		SCE TLRR Survey No. 9	Control–Mill Creek / Casa Diablo–Control–Sherwin 115kV TL (Segment)	Control Station	1918	n/a	Yes	Noncontributing
36-010136		SCE TLRR Survey No. 13	Bishop Creek–San Bernardino “Tower Line” / Control–Haiwee No. 1 and 2 115kV / (Segment)	Control Station	1912	n/a	Yes	Individually Eligible / Contributing
		SCE TLRR Survey No. 38	Control-Inyo 115kV TL	Control Station	1976	n/a	Yes	Not Individually Eligible / Noncontributing
		SCE TLRR Survey No. 32	Control–Morgan–Plant 2 55kV	Control Station	1908–1927, 1966	n/a	Yes	Noncontributing
		SCE TLRR Survey No. 35	Control–Mt. Tom 55kV	Control Station	1966	n/a	Yes	Not Individually Eligible / Noncontributing
		SCE TLRR Survey No. 12	Control–Oxbow 115kV	Control Station	1988	n/a	Yes	Not Individually Eligible / Noncontributing
		SCE TLRR Survey No. 30	Control–Plant 3–Plant 4 115kV	Control Station, Plant 3, Plant 4	1905	n/a	Yes	Noncontributing
		SCE TLRR Survey No. 39	Control–Plant 5–Plant 6 55kV	Control Station, Plant 5, Plant 6	1913–1919	n/a	Yes	Noncontributing
		SCE TLRR Survey No. 33	Control–Silver Peak "A" 55kV	Control Station	1905	n/a	Yes	Contributing
		SCE TLRR Survey No. 34	Control–Silver Peak "C" 55kV	Control Station	1908	n/a	Yes	Contributing
		LW-15	Lake Sabrina Rd.		1906		Yes	Contributing
		LW-4	South Lake Rd.		ca. 1900s		Yes	Not Individually Eligible / Contributing
		SCE TLRR No. 29	Access Road to Control–Plant 3–Plant 4 115kV Transmission Line		1904–1905, 1913		Yes	Not Individually Eligible / Noncontributing
		SCE TLRR No. 40	Plant 5 Rd.		1907		Yes	Contributing
		SCE TLRR No. 41	Plant 6 Rd.		ca. 1860s, 1913		Yes	Contributing
		SCE TLRR No. 42	Unnamed Rd. [along Abelour Ditch]		ca. 1875 (date ditch constructed)		Yes	Contributing
		SCE TLRR No. 43	East Bishop Creek Rd.		Before 1913		Yes	Individually Eligible / Contributing
		SCE TLRR No. 20	Access Road to SCE Bishop Creek–San Bernardino "Tower Line"		1911–1913		Yes	Contributing

East Bishop Creek Road is one segment of several that make up Old Highway 168 (County Road). The remaining segments of Old Highway 168 include Big Timbers Road, West Bishop Creek Road, Skyrock Drive, and archaeological sites 158,159, and 2034. Big Timbers Road, West Bishop Creek Road, and Skyrock Drive were not surveyed, inventoried, and evaluated in 2020 or 2021 and therefore, not included in this survey.

Surveys revealed that each of the BCHPHD plants, a series of transportation corridors related to the former workers housing are extant. These transportation corridors are not individually eligible; however, they may contribute to the landscape features at each plant as they convey the previous uses at each location.

8.11.7.4 Noted but Not Recorded in the BCHPHD

As stated above, the four resources (two within the APE) associated with and date from the BCHPHD period of significance have not been recorded or evaluated (Table 8.11-8).

Table 8.11-8. Bishop Creek Hydroelectric Project Historic District Noted but Not Recorded Resources

Historic Name / Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
Rock Storage Unit	Plant 4	?	n/a	Yes	Noted but not recorded.
Incinerator cone	Plant 4	1907 ca.	n/a	Yes	Noted but not recorded.
South Lake Weather Station	Hillside (South Lake) Dam	?	n/a	No	Noted but not recorded.
Lake Sabrina Weather Station	Lake Sabrina Dam	?	n/a	No	Noted but not recorded.

Source: HRA 2020

8.11.7.5 Transportation in the BCHPHD

The original recording of Highway 168 included the historic alignment that runs between the power plants. For the survey, the portion of Old Highway 168 that is historically associated with the BCHPHD was separated from the new State Road 168, which is included as a survey population of one (Table 8.11-9) because it was constructed during the historic period as defined for this study and crosses the APE at a number of locations.

Table 8.11-9. Road

Temporary Number	Historic Name/ Current Name	Associated Facility	Date(s) of Construction	Previous NRHP Eligibility	In APE?	Current NRHP Recommendations
LW-3 / SCE TLRR No. 45	State Route 168		1966		Yes	Not Eligible

8.11.7.6 Mining in the BCHPHD

In 2020, the Relicensing Team completed a survey of the built-environment resources associated with the Wilshire–Bishop Creek (Cardinal) Mine Historic District camp area that Zeier and colleagues and Firby and colleagues recorded in 1982. This area originally contained mining-related buildings but has since been transformed into the Cardinal Village Resort. As noted earlier, the historic district, which has been documented as P-14-002529 (FS 05-04-53-0010), contains both built environment and archaeological resources and was previously recommended eligible for listing in the NRHP under Criteria A, B, C, and D; the California SHPO concurred with this recommendation in a letter dated June 7, 1983 (Ref: FERC830428B). No built-environment resources associated with the district are located in the APE. P-14-002529 intersects with the APE along portions of the free-flowing Middle Fork Bishop Creek (within the FERC boundary); no SCE facilities are associated with these sections of the creek.

The built environment study documented the survey and inventory of built-environment resources associated with the camp and present-day Cardinal Village Resort and updated the district record accordingly. No individual BSO records were created.

Neither the Zeier nor the Firby studies specifically named contributing and non-contributing resources within the recommended-eligible Wilshire–Bishop Creek (Cardinal) Mine Historic District. However, Zeier and colleagues (1982a) did indicate that all of the resources they recorded associated with the camp (i.e., the built-environment resources) retained all seven aspects of integrity. The implication at the time thus seems to have been that all extant buildings were considered contributing resources at that time.

Ten contributing built-environment resources and 14 non-contributing built-environment resources were located within the eligible Wilshire–Bishop Creek (Cardinal) Mine Historic District. One resource recorded in Zeier and colleagues (1982a) has since been demolished (14-002529-36: Drunken Sailor). Nine of the recommended non-contributing resources have not yet achieved 45 years of age (Table 8.11-10).

8.11.7.7 U.S. Forest Service Recreation Residences Tracts

In 2020, SCE completed a survey of the built-environment resources associated with the USFS RRTs that intersect with the Bishop Creek Project APE along portions of the free-flowing South Fork Bishop Creek or Middle Fork Bishop Creek. An assessment of the built-environment resources will be included in the FTR (refer to Pickrell et al. 2022 for further discussion of archaeological resources associated with the Lake Sabrina RRT). Three RRTs were established in the early 1920s that are associated with resources within the APE: South Fork Bishop RRT (FS 05-04-53-01726), Lake Sabrina RRT (FS 05-04-53-01723), and Utter RRT (FS 05-04-53-01727). These tracts were originally recorded as part of two larger studies. First, Lux and colleagues (2000) focused on the built environment and included in their report a multiple property document (MPD) created by University of California landscape architecture professor Steve McNeil, entitled, Recreation Residence[s] Tracts in the National Forests of California from 1906 to 1959. McNeil's MPD lays out the evaluation criteria and registration requirements under which researchers should evaluate these resources (Lux et al. 2000). The second report, conducted by Mountain Heritage Associates (2003), concentrated on archaeological resources associated with the tracts. Later studies conducted by the NPS team working on behalf of INF (Dickey et al. 2007a, 2007b, 2007c) used the evaluation criteria and registration requirements outlined in the MPD and concluded that the South Fork Bishop and Lake Sabrina RRTs are eligible as historic districts under Criteria A and C, but that the Utter RRT is not eligible for listing in the NRHP.

The 2007 DPR forms accurately described these three RRTs. Therefore, the current study provided a current condition assessment of the contributing elements of the South Fork Bishop and Lake Sabrina RRTs, as well as recorded newly identified features. Individual DPR updates of the elements of the district that fall outside of the APE were not generated. No updated DPR forms were generated for the Utter RRT, since it was previously determined not eligible.

8.11.7.8 South Fork Bishop Recreation Residence Tract

The 2007 NPS study (Dickey et al., 2007b) identified a period of significance of 1922–1959 for the South Fork Bishop RRT and recommended that the district comprise nine contributing resources and one non-contributing resource within the historic district. The current study identified two modern footbridges that do not contribute to the historic district (Table 8.11-11).

8.11.7.9 Lake Sabrina RRT

The 2007 NPS study (Dickey et al., 2007a) identified a period of significance of 1923–1959 for the Lake Sabrina RRT and recommended that the district comprises seven contributing resources and one non-contributing resource. The current study identified two modern footbridges that do not contribute to the historic district (Table 8.11-12).

Table 8.11-10. Wilshire–Bishop Creek (Cardinal) Gold Mine / Cardinal Village Resort Resources

Primary Number	Historic Name	Current Name	Primary Construction Date	Major Alteration	Previous NRHP Eligibility	Current NRHP Eligibility
14-002529	Wilshire–Bishop Creek (Cardinal) Mine	Cardinal Village Resort (CVR)	1906–1908, 1933–1938, ca. 1946–ca. 1959	n/a	Eligible Historic District	Eligible Historic District
14-002529-31	Stable	CVR Golden Trout #3	1906–1908	ca. 1946	Contributing	Contributing
14-002529-32	Miner's House	CVR Emerald #4	1906–1908	1930s, ca. 1947	Contributing	Noncontributing
14-002529-33	Miner's House	CVR Baboon #5	1930s	n/a	Contributing	Noncontributing
14-002529-35	Miner's House	CVR Blue Heaven/ Hungry Packer	1930s	moved to current site in 1986–1987	Contributing	Noncontributing
14-002529-36	Drunken Sailor	n/a	1930s	moved and demolished	Contributing	n/a
14-002529-37	Transformer House	Transformer House	1906–1908	n/a	Contributing	Contributing
14-002529-38	Miners' Bunkhouse	CVR Midnight #8	1906–1908	1950s	Contributing	Contributing
14-002529-39		CVR Thunder & Lightning	1950s/1960s or ca. 1970–1971	n/a	Unevaluated	Noncontributing
14-002529-41	Miner's House	CVR Topsy Turvy #2	1906–1908	1930s?	Contributing	Contributing
14-002529-42	Miner's House	CVR Loch Leven #1	1906–1908	1930s, 1950s?	Contributing	Noncontributing
14-002529-43	Mine Office	CVR Lodge	1906–1908	1930s, 1950s?	Contributing	Contributing
14-002529-44	Miners' Bunkhouse	CVR Lamarck #10	1906–1908	1950s	Contributing	Contributing
14-002529-45	Miners' Bunkhouse	CVR Moonlight #11	1906–1908	n/a	Contributing	Contributing
14-002529-46	Meat House	Meat House	1895; 1906–1908	n/a	Contributing	Contributing

Primary Number	Historic Name	Current Name	Primary Construction Date	Major Alteration	Previous NRHP Eligibility	Current NRHP Eligibility
14-002529-48	Miner’s House	CVR Blue Lake #9	1930s	n/a	Contributing	Contributing
14-002529-49	Post Office	Post Office??	1930s	n/a	Contributing	Contributing
		CVR Lecture Hall	1998–2000	n/a	Unevaluated	Non-contributing
	Outhouse at lecture hall	CVR Tack Shed	1998?	Moved ca. 1998	Unevaluated	Non-contributing
		CVR Woodshed	2000–2001	n/a	Unevaluated	Non-contributing
		CVR Fishgut	c. 2003	n/a	Unevaluated	Non-contributing
		CVR Bottleneck	c. 2003	n/a		Non-contributing
		CVR Outdoor Pizza Kitchen / Garage	c. 2004	n/a		Non-contributing
		CVR Greenhouse	c. 2011	n/a		Non-contributing
		CVR Bobcat Shed	c. 2018	n/a		Non-contributing
		CVR Pavilion	2020	n/a		Non-contributing

Table 8.11-11. South Fork Bishop Recreation Residences Tract Historic District

USFS Number and Lot	Resource Name	Date Constructed	In APE?	NRHP Eligibility
05-04-53-01726	South Fork Bishop RRT	1922–1959	Yes (partial)	Eligible Historic District
Lot 1	Cabin 1 and outhouse	ca. 1938	No	Contributing
Lot 2	Cabin 2 and outhouse	ca. 1940	No	Contributing
Lot 3	Cabin 3 and outhouse	Pre-1951	No	Contributing
Lot 4	Cabin 4, outhouse, and outbuilding	ca. 1935	No	Contributing
Lot 5	Cabin 5 and outhouse	ca. 1933	No	Noncontributing
Lot 6	Cabin 6, outhouse, and outbuildings	Pre-1940	Yes (cabin only)	Contributing
Lot 11	Cabin 11, outhouse, and shed	ca. 1950	No	Contributing
Lot 12	Cabin 12 and shed	ca. 1939	No	Contributing
Lot 13	Cabin 13, outhouse, and shed	ca. 1930s (shed built ca. 1968)	No	Contributing (Shed does not contribute)
Lot 14	Cabin 14 and shed	ca. 1952	No	Contributing
	Footbridge over Bishop Creek by Lot 6	ca. 1995	Yes	Non-contributing
	Footbridge over Bishop Creek to South Fork of South Fork RRT	ca. 1980	Yes	Non-contributing

Table 8.11-12. Lake Sabrina Recreation Residences Tract Historic District

USFS Number	Resource Name	Date Constructed	In APE?	NRHP Eligibility
05-04-53-001723	Lake Sabrina RRT		Yes (partial)	Eligible Period of Significance: 1936–1959
Lot 1	Cabin 1 and outhouse	Pre-1959	No	Contributing
Lot 14	Cabin 14 and associated pump house	Pre-1944	Yes (pumphouse only)	Contributing
Lot 15	Cabin 15, root cellar, shed, and outhouse	Early 1930s	No	Contributing
Lot 16	Cabin 16, carport, and outbuilding	Early 1930s	No	Contributing
Lot 17	Cabin 17 and outhouse	Early 1930s	No	Contributing
Lot 18	Cabin 18 and outhouse	Pre-1948	Yes (cabin only)	Contributing
Lot 20 (also 14-002529-49)	Cabin 20	1930s	No	Contributing
Lot 21	Cabin 21 and outhouse	Pre-1969	No	Non-contributing
	Wooden Bridge over Middle Fork Bishop Creek	ca. 1980	Yes	Non-contributing
	Concrete Bridge over Middle Fork Bishop Creek	ca. 1980	Yes	Non-contributing

8.11.7.10Aspendell

Additional recreational residences within the APE include buildings located in the community of Aspendell. The FERC boundary through Aspendell is a 100-foot corridor along a free-flowing section of Bishop Creek. SCE has no facilities within this portion of the APE and believes that operations have little potential to affect these resources, which are listed in Table 8.11-13. As such, no further research, inventory, or evaluation of these resources was conducted. If the current form of normal operations changes or if future license-related actions create a new potential to affect historic properties within the APE, SCE will follow the inventory, evaluation, and effects assessment process to be outlined in the forthcoming HPMP for the Bishop Creek Project. At the time of any such action, SCE will update Table 8.11-13 to include resources that have since met the age criteria that qualifies them for NRHP evaluation.

Table 8.11-13. Aspendell Recreation Residences within APE

APN	Street Address	Year Built	45+ Age of Construction
014-281-01	280 Cataract Rd.	1965	Yes
014-281-02	274 Cataract Rd.	No date listed	Unknown
014-281-05	256 Cataract Rd.	1972	Yes
014-281-15	215 Cataract Rd.	1980	No
014-281-19	268 Cataract Rd.	1983	No
014-281-20	262 Cataract Rd.	1964	Yes
014-281-21	250 Cataract Rd.	No date listed	Unknown
014-281-22	244 Cataract Rd.	1965	Yes
014-281-23	238 Cataract Rd.	1967	Yes
014-281-24	226 Cataract Rd.	1983	Yes
014-282-01	123 Columbine Dr.	1975	Yes
014-282-09	145 Columbine Dr.	1992	No
014-282-11	151 Columbine Dr.	1970	Yes
014-282-14	169 Columbine Dr.	1986	No
014-282-17	175 Columbine Dr.	1987	No
014-282-20	193 Columbine Dr.	2011	No
014-282-21	199 Cataract Rd.	1980	No
014-282-24	181 Columbine Dr.	1977	No
014-282-26	133 Columbine Dr.	1967	Yes

APN	Street Address	Year Built	45+ Age of Construction
014-292-04	234 Brook Ln.	1970	Yes
014-292-05	246 Brook Ln.	2000	No
014-292-06	258 Brook Ln.	1992	No
014-292-07	270 Brook Ln.	1975	Yes
014-292-15	282 Brook Ln.	1967	Yes
014-292-17	208 White Pine Rd.	1966	Yes
014-292-18	222 Brook Ln.	1990	No
014-293-01	203 Columbine Dr.	1999	No
014-293-02	209 Columbine Dr.	1979	No
014-293-03	217 Columbine Dr.	1979	No
014-293-04	223 Columbine Dr.	1971	Yes
014-293-05	229 Columbine Dr.	1973	Yes
014-293-06	203 Cardinal Rd.	2006	No
014-293-07	215 Cardinal Rd.	1981	No
014-293-08	227 Cardinal Rd.	1977	No
014-293-09	239 Cardinal Rd.	1969	Yes
014-360-02	16621 W Hwy 168	No date listed	Unknown
014-360-03	16601 W Hwy 168	No date listed	Unknown
014-360-04	16621 W Hwy 168	2004	No

8.11.7.11Boat Landings

In 2020 and 2021, architectural historians completed a survey of the built-environment resources and identified two individual boat launch complexes within the Bishop Creek Project APE (Table Table 8.11-14). A full physical description and NRHP evaluation is provided below, as well as DPR forms.

Table 8.11-14. Miscellaneous Nonresidential Recreation Facilities

Primary Number	USFS Number	Temporary Number	Resource Name	Primary Construction Date	In APE?	NRHP Eligibility
—	—	HRA-20	Parchers Resort South Lake Boat Landing Complex	1970s, 1984, ca. 1990	Yes	Not Eligible
—	—	HRA-25	Lake Sabrina Boat Landing Complex	ca.1964	Yes	Not eligible

8.11.8 Traditional Cultural Properties

No non-native traditional resources have been identified within the APE. Non-native resources anticipated to be identified within the APE are likely to be related to the Basque settlement and sheep herding, as well as recreation including pack stations.

8.11.8.1 Potential Paiute Irrigation System Historic District

As discussed above, the Paiute used water from Bishop Creek to irrigate lands within and adjacent to the APE. Several of the ditches used by the Bishop Paiute have been identified and described some of which were identified within the APE during the 2020 survey. This resource type is a central theme of the Tribal Research included in the Tribal Resources Study report (Davis-King, in progress). Rather than evaluating and managing individual ditch segments as separate archaeological sites, the irrigation system may benefit from the designation of a potential Paiute Irrigation System Historic District, with contributing and noncontributing resources.

Table 8.11-15. Archaeological Resources within the APE Associated with a Potential Paiute Irrigation System Historic District

Primary	USFS/BLM Number	Temporary Number	Description
P-14-012791	—	SC-BC-3	Irrigation ditches and holding pond
—	—	BC04	Irrigation ditch
—	—	BC10	Irrigation ditch

8.11.9 Current Cultural Resources Management

As part of the previous relicensing, SCE prepared a document entitled Management Plan for Historic and Archaeological Resources Associated with the Historic and

Archaeological Preservation Plan for the Bishop Creek Hydroelectric Project (FERC Project 1394), Inyo, California (White 1989). The plan identifies specific measures undertaken by SCE to avoid adverse impacts to the NRHP eligible properties located within the Bishp Creek Project boundary and various programmatic measures that SCE is required to implement. Resource monitoring and recordation of the NRHP within the Bishop Creek Project boundary is required to occur in three 5-year increments to determine the success of current measures and to evaluate the need for additional treatment.

8.11.10 Current Potential Adverse Effects and Issues

The purpose of identifying effects is to determine which sites need to be evaluated for listing in the NRHP in the near future and to aid in the development of management/protection measures that will be incorporated into the HPMP for the Bishop Creek Project. FTRs include analysis of potential effects and PME measures and are in review with SCE, the Tribes, and the agencies. This information will be incorporated into the FLA once it has been reviewed and agreed upon.

8.11.10.1Proposed Mitigation and Enhancement Measures

Potential effects and PME measures related to this resource, will be described in the FTRs after review with Tribes and agencies. This information will be incorporated into the FLA, to filed with FERC in June 2022. An HPMP (PME-9) is being developed and will be filed after consultation with the appropriate stakeholders. The HPMP will include guidelines for monitoring archaeological site conditions as well as PME measures to avoid, minimize, and/or mitigate direct and indirect effects to NRHP eligible or listed resources.

8.11.10.2Consistency with the Inyo National Forest Land Management Plan

SCE reviewed the desired conditions in the INY Land Management Plan for consistency with the Bishop Creek Project (USDA 2019). Desired conditions with which the Bishop Creek Project is consistent include:

- CULT-FW-DC 01: Cultural resources (buildings, sites, districts, structures, and objects) having scientific, cultural or social values are preserved and protected for their cultural importance. Site integrity and stability are protected and maintained on sites that are susceptible to imminent risks or threats, or where values are rare or unique. Priority heritage assets are stable and their significant values protected; vandalism, lootings, theft, and human-caused damage to heritage resources are rare. Site significance and integrity are maintained through conservation and preservation efforts.

- CULT-FW-DC-03: Cultural resources provide educational opportunities that connect people to the land and its history. Through interpretive sites, historic standing structures, and other materials, the national forest provides opportunities for an appreciation of the region’s history and an awareness of preservation efforts.

In some cases, historic routes (such as railroad grades) are used for recreation trails with interpretation of their history and historic features. Heritage-based recreation opportunities are connected, where practical, with other recreation opportunities such as trails.

- VIPS-FW-DC 06: Nationally registered historic sites and culturally important properties retain their historic and cultural significance when public use and education opportunities are provided.
- Effects of continued Bishop Creek Project operation on archaeological or built environment resources, traditional cultural properties or archaeological resources that have associated tribal values that may be eligible for inclusion in the NRHP.

Direct effects related to the Bishop Creek Project include construction, and O&M of Bishop Creek Project facilities or features within or adjacent to archaeological sites. Examples of such include ground disturbance caused by maintenance on the penstocks and flowlines that cross site boundaries and wave action on shoreline archaeological sites and deposits as reservoir levels fluctuate. In the cases where archaeological sites are located along free-flowing portions of the creeks, no Bishop Creek Project-related effects were identified. Examples of direct effects to built environment resources may include construction of new buildings next to other elements or within a district; replacement of windows, roofs, or other parts of built environment resources; and new paint.

The second set of direct effects identified consist of those posed by activities associated with non-project related infrastructure, development, and recreational use. Examples of infrastructure include a number of transmission lines, the alignments of which cross the APE but are not associated with the Bishop Creek Project. Situated within public lands managed by the BLM and INF, much of the APE is utilized recreationally by the public, on foot, on horseback, in land vehicles, and in boats. Examples of Forest Service facilities overlapping or adjacent to the APE include campgrounds, comfort stations, parking areas, and hiking trails. Evidence of recreational use extending into archaeological site boundaries include designated hiking trails as well as pedestrian tracks deviating from the established trails and modern trash within archaeological resources. As access to the roads within the APE is not limited to Project personnel, their presence within and adjacent to archaeological sites is identified as a non-project related effect. Other effects not related to Bishop Creek Project O&M such as looting were also identified.

8.11.11 References

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8.12 SOCIOECONOMIC RESOURCES

This section describes the socioeconomic resources that have the potential to occur in the Bishop Creek Project area. The discussion here is intended to provide background for evaluating potential issues as summarized in the TSP and SD1 (Table 8.1-1) relating to the Proposed Action; and how the completed studies inform our understanding of Bishop Creek Project effects.

The Bishop Creek Project area is located in Inyo County, California; approximately 4 miles outside the city of Bishop, the largest incorporated city in Inyo County (Figure 8.1-1). Bishop is a small city with a total area of 1.91-square-miles, located at elevation 4,150 feet. Bishop Creek flows into the Owens River Valley as a tributary to Owens River. The largest cities in the Owens River Valley are Bishop, Lone Pine, Independence, and Big Pine. The following is a summary of socioeconomic data for the City of Bishop and Inyo County, including population patterns, average household income, and employment sectors. During scoping and early TWG meetings that culminated in the Final TSP, no issues or potential effects were raised with regards to socioeconomic resources.

8.12.1 GENERAL LAND USE PATTERNS

Although Inyo County encompasses a large land area, over 300,000 acres, only approximately 1.9 percent of the land is held in private ownership. Federal agencies manage 91 percent of the land, the state of California owns 3.5 percent, LADWP owns 2.7 percent, and other local agencies (including tribal entities) own the remaining 0.3 percent. This ownership encompasses a large proportion of the Owens Valley floor in Inyo County (Inyo County 2014). Outside of Bishop and the unincorporated communities of Big Pine, Independence, Lone Pine, and Aberdeen, the primary land use in the Owens Valley is open space, devoted to agriculture (generally grazing), outdoor recreation, and resource conservation.

8.12.2 POPULATION PATTERNS

Table 8.12-1 summarizes the population estimates for Bishop, Inyo County, and the state of California as reported in the 2019 American Community Survey (ACS) 5-year estimates. The population of Bishop is estimated at 3,745 with a population density of 2,009 people per square mile. Bishop is one of the most densely populated areas of Inyo County, which has a population of 17,977 and a population density of 1.5 people per square mile (Table 8.12-1). The population of Into County is estimated to have decreased by 2.7 percent between 2010 and 2019.

Approximately 79 percent of the Inyo County population identified as white while 11 percent identified as American Indian and Alaska Native. Additionally, 22 percent of Inyo County and 24 percent of Bishop identify as Hispanic. Several American Indian tribes and reservations are established in Inyo County, including the Big Pine Paiute Tribe of the Owens Valley, Bishop Paiute Tribe, Timbi-Sha Shoshone Tribe, the Fort Independence Paiute Reservation, and the Lone Pine Tribe. Table 8.12-2 summarizes the population and economy of these tribal areas.

Most of the population throughout Inyo County, including the tribal areas, have attained a high school or higher level of schooling. Twenty-seven percent of Inyo County's population, and 39 percent of Bishop's population, attained a Bachelor's degree or higher (Table 8.12-1). Although the majority of the populations in the tribal areas are high school graduates or higher, the proportion who attained a Bachelor's degree or higher is much lower compared to the rest of the county (6 to 13 percent) (Table 8.12-2).

Table 8.12-1. Population Statistics of Bishop City, Inyo County and California

Stats	Bishop City, CA	Inyo County, CA	California
Total Population	3,745	17,977	39,283,497
Area (square miles)	1.9	10,197.2	155,854
Population Density (people per square mile)	2,009.3	1.5	253.5
2010-2019 Population Change (percent)	n/a	-2.7	+6.1
White	81.7	78.8	59.7
Black or African American	1.1	0.9	5.8
American Indian and Alaska Native	0.0	11.3	0.8
Asian	5.3	1.9	14.5
Native Hawaiian and Other Pacific Islander	0.0	0.2	0.4
Some Other Race	1.2	2.2	14.0
Two or More Races	10.6	4.7	4.9
Hispanic	23.7	22.4	39.0
Non-Hispanic	76.3	77.6	61.0
High school graduate or higher	92.8%	88.6%	83.3%
Bachelor's degree or higher	38.5%	27.2%	33.9%

Source: U.S. Census Bureau 2019

Table 8.12-2. Population and Economic Statistics for Tribal Areas within Inyo County, CA

Stats	Big Pine Reservation and off Reservation Trust Land	Bishop Reservation	Fort Independence Reservation	Lone Pine Reservation	Timbi-Sha Shoshone Reservation and off Reservation Trust Land, CA and NV
Population	409	1,587	82	182	26
Unemployment Rate	5.8%	9.1%	0.0%	4.3%	33.3%
No. Housing Units	179	645	53	89	20
Median House Value	$95,000	$177,600	$213,200	$77,500	n/a
Median Household Income	$40,625	$41,471	$56,250	$35,750	(Mean) $27,669
Persons below poverty line	9.5%	11.4%	19.5%	6.6	7.7%
High School Graduate or higher	95.6%	90.0%	93.7%	94.4%	100%
Bachelor's Degree or higher	5.5%	6.9%	12.7%	6.3%	11.8%

Source: My Tribal Land 2019 a, b, c, d

8.12.3 Households/Family Distribution and Income

Table 8.12-3 provides a summary of income statistics for the Bishop Creek Project vicinity and within California. Although the median income within the City of Bishop ($36,541) is comparable to the median income of California ($36,955), the median per capita income of Inyo County is approximately 10 percent lower than the state, at $32,590 annually (U.S. Census Bureau 2019). Despite lower incomes, the poverty rate in Bishop (7 percent) and Into County (9 percent) are lower than the state poverty rate (13 percent) (U.S. Census Bureau 2019). Table 8.12-4 summarizes the cost of housing and the rate of homeownership within the City of Bishop, Inyo County, and California.

Table 8.12-3. Income Statistics for Bishop, Inyo County, and California

Economic Stats	Bishop	Inyo County	California
Number of Households	1,993	7,950	13,044,266
Per Capita Income	$36,541	$32,590	$36,955
Median Household Income	$62,067	$57,316	$75,235
Persons Below Poverty Line	6.6%	9.3%	13.4%

Source: U.S. Census Bureau 2019

Table 8.12-4. 2019 Estimated Housing Statistics for Bishop, Into County and California

Housing Stats	Bishop	Inyo County	California
Number of Housing Units	2,187	9,572	14,175,976
Home Ownership	38%	65%	55%
Median Value of Housing Units	$319,000	$269,100	$505,000

Source: U.S. Census Bureau 2019

8.12.4 Project Vicinity Employment Sources

2019 labor force and unemployment rates are summarized in Table 8.12-5. Unemployment in Inyo County increased from 3.6 percent in 2019 to 7.8 percent in 2020, during the COVID-19 pandemic (EDD 2021a).

Inyo County is within California’s Eastern Sierra Economic Sub-Market region as defined by the state of California Employment Development Department (EDD) (EDD 2015). The top five industry clusters in this market by number of employment projections are:

1. Hospitality and tourism
2. Retail
3. Health care services
4. Construction materials and services
5. Education and training (EDD 2015)

The EDD provides annual average employment for each industry (Table 8.12-6). State and local governments are the largest employer in Inyo County, followed by leisure and hospitality industry, with retail trade at third (Table 8.12-6). Industries experienced a decline in employment in 2020 during the COVID-19 pandemic. Table 8.12-7 lists the top employers in Into County, CA.

Table 8.12-5. Estimated Labor and Employment Statistics for Bishop, CA, Inyo County, and California, 2018 - 2020

Location	2018		2019		2020	
	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate
California	19,263,900	4.3	19,353,700	4.2	18,821,200	10.1
Inyo County	8,700	3.9	8,750	3.6	7,660	7.8
Bishop	1,620	3.3	1,920	3.3	1,810	7.1

Source EDD 2021a

Table 8.12-6. Labor Force and Industry Employment in Inyo County, CA 2018 - 2020

Industry	Annual Average Employment		
	2018	2019	2020
Civilian Labor Force	**8,700**	**8,750**	**8,310**
Civilian Employment	8,360	8,440	7,660
Civilian Unemployment	340	310	650
Civilian Unemployment Rate	3.9%	3.6%	7.8%
Total, All Industries	7,620	7,800	7,130
Total Farm	50	40	30
Total Nonfarm	7,570	7,750	7,100
Total Private	4,480	4,560	4,020
Goods Producing	560	550	540
Mining, Logging and Construction	250	240	240
Mining and Logging	10	10	10
Construction	240	230	230
Manufacturing	310	320	310
Durable Goods	30	30	40
Nondurable Goods	280	290	270
Service Providing	7,020	7,200	6,560
Private Service Providing	3,930	4,010	3,480
Trade, Transportation & Utilities	1,250	1,240	1,160
Wholesale Trade	90	90	90
Retail Trade	970	950	880
Transportation, Warehousing & Utilities	190	190	190
Information	40	50	40
Financial Activities	160	160	150
Professional & Business Services	230	210	210
Educational & Health Services	440	470	490
Leisure & Hospitality	1,600	1,680	1,290

Industry	Annual Average Employment		
	2018	2019	2020
Other Services	210	200	150
Government Service Providing	3,090	3,190	3,080
Federal Government	300	300	300
State & Local Government	2,800	2,890	2,780
State Government	370	370	360
Local Government	2,430	2,520	2,420

Source: EDD 2021b

Table 8.12-7. Top Employers in Inyo County, CA

Employer Name	Location	Industry
Aqueduct System	Bishop	Government Offices-City/Village & Twp
Bishop Care Ctr	Bishop	Nursing & Convalescent Homes
Bishop Paiute Gaming	Bishop	Casinos
C G Roxane Water	Olancha	Water Companies-Bottled/Bulk
Carsons Tahoe Behavioral Health	Bishop	Mental Health Services
Death Valley National Park	Death Valley	National Parks/Preserves
Department of Water & Power	Independence	Government Offices-City/Village & Twp
High Country Lumber	Bishop	Hardware-Retail
Independence Courthouse	Independence	County Government-Courts
Inyo County Probation Dept	Bishop	Government Offices-County
Inyo County Sheriff	Independence	Government Offices-County
Inyo-Mono Advocates	Bishop	Child Care Service
Lone Pine Unified School District	Lone Pine	School Districts
Los Angeles Water Supply Division	Bishop	Government Offices-City/Village & Twp
Mc Donald's	Bishop	Limited-Service Restaurant
Oasis At Death Valley	Death Valley	Hotels & Motels
Owen Valley High School	Independence	Schools
Paiute Palace Casino	Bishop	Casinos
Round Valley Elementary School	Bishop	Schools
Schat's Retail Bakery	Bishop	Bakers-Retail
Stovepipe Wells Village	Death Valley	Hotels & Motels
Toiyabe Indian Health	Bishop	Federal Government-Public Health Programs
Transportation Dept-Ca District 9	Bishop	Government Offices-State
US Forestry Department	Bishop	Government-Forestry Services
Vons	Bishop	Grocers-Retail

Source: EDD 2021c

8.12.5 PROJECT SERVICE AND EMPLOYMENT SOURCES

SCE supplies power to 15 million people, covering an area of 50,000 square miles, including 15 counties and 180 incorporated cities (SCE 2021a). SCE employs 13,105 people across California (SCE 2021b). As of December 2020, 61 percent of SCE employees identified as racially and ethnically diverse, and 45 percent of the companies' officers were diverse in terms of race, ethnicity, and gender (SCE 2021b). Table summarizes the diversity among SCE employees.

SCE provides monetary stimulus to the surrounding communities through employee benefits, including salary and taxes. The Bishop Creek Project is operated by both full-time employees and seasonal employees. In addition to SCE's full-time employees, the workforce includes contract workers who support SCE's operations including transmission and distribution, vegetation management, information technology and customer service activities. SCE employees receive compensation packages which include health care and a 401(k) savings plan with company match (SCE 2020). In 2020 SCE paid $241,900 in state and local taxes; these taxes help support local public services and infostructure.

Table 8.12-8. Diversity among SCE Workforce, by Ethnic Group as of December 31, 2020

Job Category	White	Black or African American	Hispanic or Latino	Asian	Native Hawaiian or Pacific Islander	American Indian or Alaskan Native	Two or More Races	Female
Exec/Sr Managers	64%	8%	11%	14%	1%	0%	3%	36%
First/Mid-level Managers	50%	6%	27%	13%	0%	1%	3%	25%
Professionals	35%	7%	30%	24%	1%	0%	4%	42%
Technicians	39%	6%	41%	9%	0%	1%	4%	26%
Admin Support	24%	11%	52%	7%	1%	1%	4%	63%
Craft Workers	49%	4%	40%	3%	0%	1%	2%	< 1%
Operatives	42%	3%	48%	1%	0%	1%	4%	< 1%
Laborers & Helpers	37%	15%	38%	4%	0%	1%	5%	11%
Service Workers	54%	21%	13%	0%	4%	0%	8%	17%

Source: SCE 2021b

Table 8.12-9. Diversity among SEC Board, Officers, and Executives as of December 31, 2021

Position	White	Black or African American	Hispanic	Asian	Native Hawaiian or Other Pacific Islander	American Indian or Alaskan Native	Two or More Races	Female
Board of Directors	67%	8%	17%	8%	0%	0%	0%	33%
Elected Officers	68%	9%	9%	9%	0%	0%	5%	27%
Non-Officer Executives	63%	7%	11%	15%	1%	0%	2%	38%
Officers and Non-Officer Executives	64%	8%	11%	14%	1%	0%	3%	36%

Source: SCE 2021b

8.12.6 Potential Adverse Effects and Issues

No changes in Bishop Creek Project operations are proposed as part of the Proposed Action, therefore no adverse socioeconomic impacts relating to continued operation of the Project are anticipated. Additionally, no potential issues or effects were identified by FERC or the TWGs relating to socioeconomic resources. Current Bishop Creek Project operations provide employment for full-time and seasonal positions, as well as contract workers. The presence of the reservoirs and associated recreation facilities provides ongoing economic opportunities to concessionaires.

The Bishop Creek Project also contributes to local socioeconomic resources through state and local tax which helps support local public services such as law enforcement, emergency services, health services, and schools.

8.12.7 Proposed Mitigation and Enhancement Measures

No existing PMEs are in place for socioeconomic resources under the current license and no new measures have been proposed.

8.12.8 References

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8.13 TRIBAL RESOURCES

This section describes background, methods, and results for the Tribal Resource Study in the Bishop Creek Project area. The discussion provides background information for evaluating potential impacts relating to the Proposed Action.

During FERC scoping and through consultation with the TWGs, the absence of Native American ethnographic background and no previous study or identification of Tribal Resources were of concern. Agencies and stakeholders requested a Tribal Resource Study, (CUL 2) was developed, reviewed by the TWGs, and filed with FERC, which approved the TSP on August 29, 2019.

Under 36 CFR§800.16(d) an APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historical properties, if any such properties exist". The current FERC Project boundary will serve as the APE but may be amended based on consultation and resource matters. The preliminary Tribal Resources APE for the Bishop Creek Project is defined as the FERC Project boundary, while the Study area for Tribal resources is defined as a 5-mile radius around the preliminary APE (Figure 8.13-1).

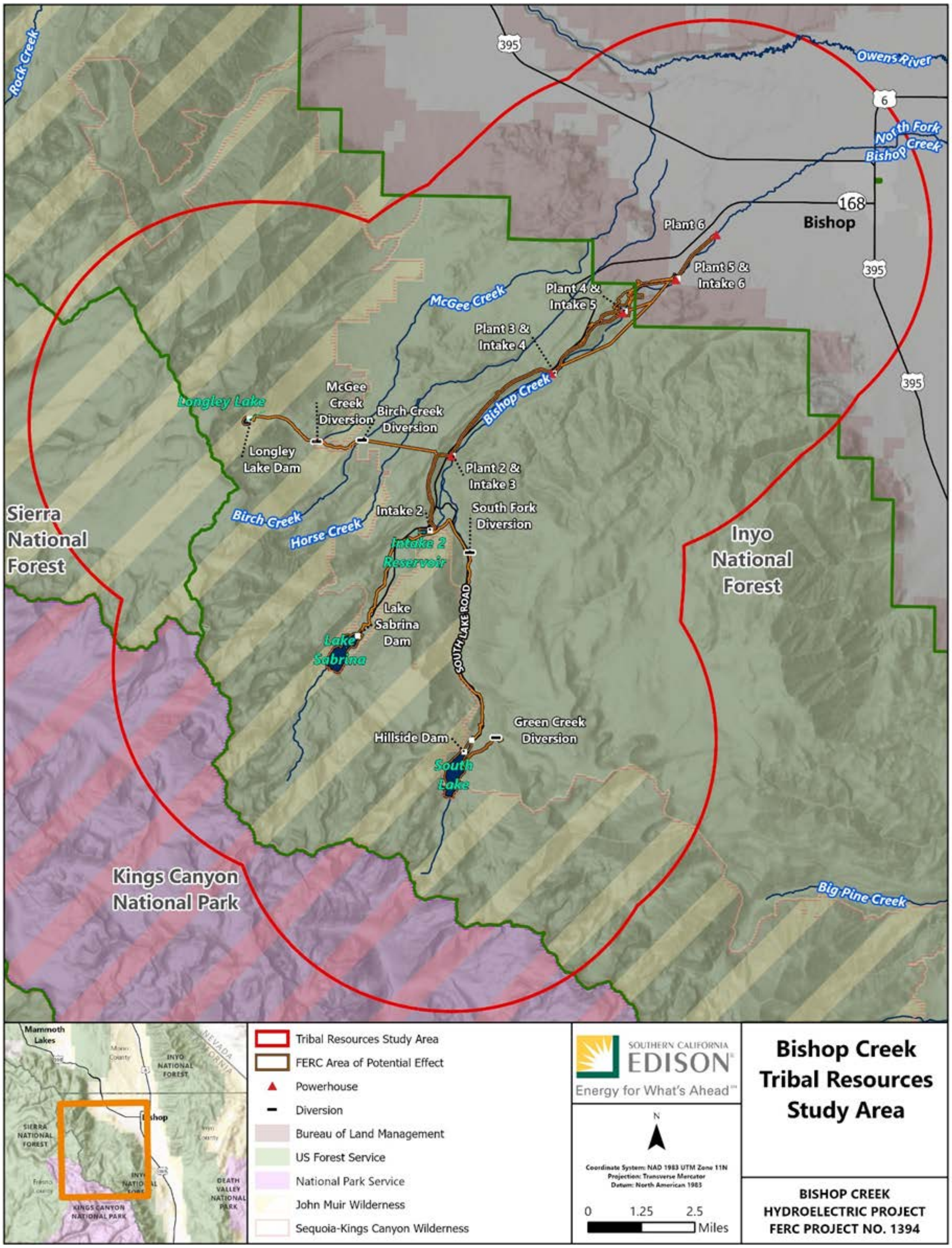

Figure 8.13-1. Project APE with a 5-Mile Buffer for the Tribal Resources Study Area.

8.13.1 OVERVIEW

The principal goal of the study was to assist FERC in identifying Tribal values and meeting compliance requirements under Section 106 of the NHPA, as amended, by determining if relicensing of the Bishop Creek Project could have an adverse effect upon historic properties and other Tribal resources. Following 18 CFR §5.6 (d)(3)(xii) and §5.9(b)(1), the goals and objectives of CUL 2 implementation are to identify Tribal resources that may be affected by O&M of the Bishop Creek Project. An ethnographic overview/background of the Bishop Creek Project area has never been conducted, and for the previous license there was minimal, if any, Tribal outreach. Therefore, the CUL 2 included the following objectives related to Tribal resources:

- Identify through archival research and oral interviews, Tribal resources that may be affected by Bishop Creek Project O&M activities.
- Evaluate Tribal resources that may be eligible for listing in the NRHP.
- Describe Tribal resources that may not be historic properties, but which nonetheless have value to Tribes.

The confidential FTR (Davis-King, 2022) will be filed with the FLA, after review by Tribes and agencies. The FTR serves to fulfill the initial objective of identifying Tribal resources that may be affected by Bishop Creek Project O&M activities and providing preliminary evaluation of those that may be historic properties for their eligibility for listing in the NRHP or may have value to the Tribes. An Effects analysis will be prepared after Tribal, agency, of SHPO review, with management measures to be prepared and incorporated into the HPMP for the Bishop Creek Project.

The analysis consists of a three-step process: (1) archival research, (2) Tribal-resource identification, and (3) NRHP evaluations. This three-step process sought to identify TCPs, resources or landscapes of traditional/cultural/spiritual importance, trust assets, and other Tribal resources that could be affected by the Bishop Creek O&M.

Archival research was initiated early in 2020 to identify nearby studies and ethnographic information to be used to establish a context by which potential Tribal resources may be identified and evaluated. Archival data regarding the Owens Valley are located in widespread repositories but provide a picture of native life which supplements the commonly referenced ethnographic studies of the last century. Potential information sources were closed during the research portion of studies due to the COVID-19 pandemic, and archival research and background data have not been fully conducted as proposed. However, online and other available libraries were used to supplement background data and form the bulk of the archival discussion.

Similarly, interviews with Tribes were anticipated to begin in the early months of 2020, with a plan to have knowledgeable experts identified soon thereafter. The COVID-19 pandemic created a logistical roadblock to such interviews, especially with Tribal governments and committees, both of which were closed during most of 2020 and 2021.

Some research was conducted with a Tribal monitor in late 2020, and in 2021 some Tribal experts were willing to meet in spite of intense smoke from wildfires and COVID-19 restrictions. Due to this, Tribal outreach and consultation is currently ongoing.

8.13.2 Tribal Lands And Interests

SCE conducted an initial search of records and maps on file at SCE archives, the INF, BLM, and the Eastern Information Center of the California Historical Resources Information System (CHRIS) at the University of California, Riverside as detailed in the CUL 1 study. Interviews and consultation notes with various settlers and Indians in the study area are found in the Eastern California Museum (ECM) and provide some knowledge of the area.

The Bishop Reservation lands were set apart for the Bishop and Big Pine Colony reservations by Executive Order 1946 of March 11, 1912, and through a land exchange, new lands were occupied in 1939 through the Act of April 20, 1937 (50 Stat. 70, c.114). As of 1900, there were 489 “Shoshonean” Indians living in Bishop (Kelsey, n.d.). According to Tribal ancestors and federal records, the amount of land available to Bishop (and perhaps Lone Pine and Big Pine, the record being vague) was in excess of 66,000 acres (Senate 1955; Testimony of Sampson Dewey, pages 303 ff). Along with the Big Pine and Lone Pine reservations, Bishop operates under a Rehabilitation Trust Agreement (approved April 17, 1939) and an Assignment Ordinance effective April 5, 1962 (BIA 1989). Separate from this, the Bishop Tribe has their own Tribal Council consisting of five annually elected members.

Reservation lands are near the Bishop Creek Project, but well outside the APE.

8.13.3 Tribal Groups

SCE requested a search of the Sacred Land Files at the California Native American Heritage Commission (NAHC) and a list of Native American contacts which may have an interest in any portion of the Bishop Creek Project area. Eight tribal groups were identified by the NAHC, as follows:

- Big Pine Paiute Tribe of the Owens Valley
- Bishop Paiute Tribe
- Death Valley Timbi-Sha Shoshone Tribe
- Fort Independence Indian Community of Paiutes
- Kern Valley Indian Community
- Lone Pine Paiute-Shoshone Tribe
- Twenty-Nine Palms Band of Mission Indians

- Walker River Reservation

SCE provided a notification letter to the Tribes informing them about the pending relicensing and requesting their participation prior to filing the PAD. A review of general ethnographic literature of the region was conducted to gather information regarding any previously recorded Tribal resources within the APE. The records searches included all lands within the FERC boundary.

SCE distributed letters to Tribes asking for their participation. Those tribes, somewhat different from the NAHC list, were:

- Big Pine Paiute Tribe of Owens Valley
- Bishop Paiute Tribe
- Bridgeport Paiute Indian Colony
- Fort Independence Indian Community of Paiute Indians
- Lone Pine Paiute-Shoshone Tribe
- Timbisha Shoshone Tribe
- Utu Utu Gwaitu Paiute Tribe of the Benton

Several meetings were held including site visits, community meetings and TWGs. The Bishop Paiute Tribe participated in TWG meetings for both aquatic resources and cultural resources.

Following the filing of the PAD and NOI on May 1, 2019, FERC initiated formal Tribal consultation on May 23, 2019 and asked for input to be used during the scoping process. Scoping meetings were held in Bishop, CA at the end of July 2019. SCE, in a letter to Tribal groups on July 11, 2019, invited Tribes to participate in the initial development of the study plans, and specifically with the implementation of CUL 2. The letter was distributed to the following Tribes:

- Big Pine Paiute Tribe of Owens Valley (Chairwoman and THPO)
- Bishop Paiute Tribe (Chairman, Environmental Director, and THPO)
- Bridgeport Paiute Indian Colony (Chairman, Environmental Department, and Cultural Department)
- Death Valley Timbisha Shoshone Tribe (Chairman and THPO)
- Fort Independence Indian Community of Paiute Indians (Chairperson and THPO)
- Lone Pine Paiute-Shoshone Tribe (Chairwoman and Cultural Resources Officer)

- Mono Lake Kutzadika'a Paiute Indian Community (Chairperson)
- Mono Lake Kutzadika'a Indian Community Cultural Preservation Association (President)
- Timbisha Shoshone Tribe (Chairperson and THPO)
- Utu Utu Gwaitu Paiute Tribe of the Benton (Chairwoman)

No comments were received on the CUL 2 study plan from Tribes or other stakeholders.

Several attempts via letter and telephone calls were made to discuss the Bishop Creek Project with the Bishop Paiute Tribal Council, but no contact was made. During the allotted research time, the Tribal Council did not meet with outsiders and government offices were shut down due to COVID-19 precautions. Detailed information regarding contact will be included in the FTR for CUL 2. Attempts to leave messages were also difficult, with the Tribal answering machine being "full" and unable to accept messages.

8.13.4 Ethnographic And Tribal Background Research

The Bishop Creek drainage in the northern Owens Valley is the heartland of the Owens Valley Paiute, a people who speak Northeastern Mono, a subgroup of the Uto-Aztecan language family (Steward 1933; Golla 2011). Ethnohistoric boundaries or shared areas between ethnohistoric American Indian groups are most commonly created based on the language people spoke at the time of initial contact. Liljeblad and Fowler (1986) indicate Owens Valley Paiute territory extending westerly to Piute Pass in the upper Bishop Creek drainage, northeasterly to Fish Lake Valley on the east side of the White Mountains, southeasterly along the western piedmont of the Inyo Mountains, southerly to Owens Lake, and the most northerly to Mammoth Lakes and Benton. Shared territory with the adjoining Northern Paiute took in the northern portion of Long Valley (Fowler and Liljeblad 1986; Merriam n.d.2).

Shared areas with the Western Shoshone took in the eastern banks of Fish Lake Valley at the Silver Peak Range in Nevada and extending southerly towards the Coso Range and Panamint Mountains. Much of this territorial description relies on Julian Steward's 1930s work with the Owens Valley people (e.g., Steward 1933). Other ethnographers place the Owens Valley Paiute northern boundary just north of the Volcanic Tableland/Round Valley towards current Crowley Lake where land was shared with the southernmost Northern Paiute group, the Kutzadikaa; Merriam (n.d.1, California Journal), for example, a clearly demarcated boundary between the two groups at or about Toms Place and understood that the Mono Lake people are Northern Paiute speakers. This boundary is based on linguistic and other data from Tribal experts gathered by ethnographers who preceded and post-dated Steward.

Historic Owens Valley Paiute were characterized by greater socio-political complexity than elsewhere in the Great Basin. Bettinger's (1978) suggestion that Owens Valley groups resided at lowland village sites for much of the year agreed with Steward's (1938) theory that the abundance of natural resources in the valley allowed people to live in groups with multiple families, totaling between 25 and 250 people, and likely occupying villages of varied sizes. Each village was integrated within a larger district with band boundaries that extended through the Owens Valley (Steward 1938). Hereditary headmen controlled access to specific resources such as pinenut groves and fishing areas (Steward 1933).

Owens Valley Paiute are fortunate to live in a fertile, well-watered valley boarded by the rich coniferous forests of the Sierra Nevada on the west, and the pinyon dense Inyo and White mountains on the east. As promoted by Steward (1933), the seasonal ecological round of the people in the past focused on different foods which could be gathered at different times of the year. Friendly relations with northern and southern neighbors meant they also had e access to the resources of the lower Owens Valley and Mojave Desert on the south and the Mono Basin to the north. Western expeditions into the mid-Sierran elevation were common into the early twentieth century where interaction with western Natives was at times friendly, and at others hostile. Pinon pinenuts provided (and still provide) an important nut food, not only for diet and trade, but as a kind of symbol of Paiute lifeways. Acorn, via trade or by gathering, was also a valuable part of the vegetable diet. Although Steward implied (1933) that most acorn acquisition came via trade, it is clear from historic documents, oral history, and newspaper accounts that Owens Valley Paiute regularly traveled westerly to acquire the nut themselves. Additionally, careful inspection of the canyons on the eastern Sierran slope reveals several populations of acorn-bearing oaks.

Intermarriage and strong genealogical associations with western Sierra Nium (Monache) and Miwuk meant that resources from multiple areas, such as salt, obsidian, feathers, shells, nuts and more could be exchanged reciprocally. Seeds from annual plants and grasses along with geophytes provided a varied and nutritious starch and protein base. Later in the summer season, irrigated geophytes were readily available. Animals played an important role in the diet, with waterfowl, terrestrial birds, fish, and larger game having value. Brine fly and brine shrimp were important for their ability to be stored and reconstituted during the winter months. Bighorn sheep remain an important species of value in oral history, and pronghorn were sometimes corralled and taken. Leporidae, as in all parts of the Great Basin, were important familial and communal food species. And last, but not least, the Pandora moth (*Coloradia pandora*) caterpillar, known as piagi, provided a mid-summer seasonal food; easily stored for later use, the distinctive circle trench around Jeffrey pine in particular is a sure sign of piagi harvesting. Liljeblad and Fowler (1986:419) record that a small gathering party could, “in short time put up a ton or more”.

Bishop Creek was the place from which the North Fork (Madera County) people originated, and indeed, the language, customs, and stories between Nium and Bishop Paiute share great affinity and similarity. The people of Bishop traveled westerly through the various Sierran passes (Pine Creek, Piute, and several “Mono” passes), with trail networks being important to communication, transportation, and trade. At least two of these corridors, the trail connecting Bishop to the higher country via North Lake to Piute Pass, and the trail that diverts from the Piute Pass trail via Sabrina along Middle Fork

Bishop Creek to Evolution Basin have a general alignment in the Project Study Area and APE.

Steward (1933:257) said that "Little trade was carried on in the Great basin," which does not appear to be consistent with oral history and interviews, but he did note that Owens Valley Natives traded with the Western Mono, making "hurried trips". This also appears inconsistent with oral testimony, where sometimes people would overwinter in another territory (e.g. Jones 1936a-d). The Owens Valley people traded what might be expected: obsidian, pinenuts, rabbit skin blankets, and baskets—receiving in exchange shells, glass beads, manzanita berries, acorns, and baskets. According to John Hudson (1904) they were very fond of Western Mono basket materials, such as redbud (*Cercus occidentalis*), sedge (*Carex spp.),* and "Pteris" (Pteris is non-native to California; suspect Hudson meant *Pteridium aquilinum*).

Native people in Owens Valley were relatively free of the events related to the missions and disease in other parts of California. They were free of most of the early problems associated with the California gold rush. There were Spanish and Mexican explorers and others in the preceding years, but interaction began in the early 1860s. According to Chalfant (1933:139) two groups came into Owens Valley in 1860 via Walker's Pass, and scouted for mines near the future Independence area. The Indians conducted friendly trade with the prospectors. Newspaper accounts of conflicts between the Owens Valley Indians and white intruders began to increase later in 1860, in part because that spring, by way of Owens Lake and Owens Valley, company after company of miners traveled through Paiute country on their way to Mono Diggings. When Mono Diggings gave out, the miners turned to Aurora in Nevada or the Coso Gold fields, south of Owens Lake. Details are provided in Davis-King (2003).

In addition to miners, ranchers were moving into the valley. A. Van Fleet settled near present Laws in August 1861, the first Anglo residence in the area, he also cut the first hay (Chalfant 1933). Charles Putnam, that autumn, put up a stone cabin at future Independence, and the place first took his name, being called "Putnam's" or "Putnam's Store" in the early years. A few others arrived soon thereafter, including the area's namesake, Samuel A. Bishop, with wife and entourage which included "several Indian herders" (Chalfant 1933:142). Bishop's Indians were likely from the Fort Tejon area, and they brought 500-600 head of cattle and 50 horses arriving at Bishop Creek in August. Calling his place San Francis Ranch, it was located "where the [Bishop Creek] stream leaves the higher sandy bench lands and gravel foothill slopes and enters the lower level of the valley approximately 3 miles south of west of the present town of Bishop" (Chalfant 1933:142). Chalfant documented that pine trees grew there and were cut to use in construction of the ranch.

By late 1861, cattlemen saw the advantages of the rich grasslands of Owens Valley, and in November, the McGee party settled in Lone Pine with 1500 head of cattle. They noted settlers in Independence, Bishop Creek, and Round Valley already by this time.

A severe winter in 1861-1862 left many feet of snow on the ground, the Paiute were hungry and in need of supplies (Earl 1980:13). Chalfant (1933:148) observing that even the settlers had only unsalted beef to eat, and queried "What must have been the plight of the Indians?" The Natives could see many head of cattle in the valley and took them to feed their families. At first a few head were allowed, but trouble began when too many were taken.

Chalfant (1933:149) recorded that "The principal Indian settlement of the northern part of the valley was on Bishop Creek, within a short distance of Bishop's camp. Indians from all parts of the valley, and beyond, gathered there in the fall of 1861 and held a big fandango." There were claims by some doctors apparently that they had medicine to prevent the American's bullets from causing damage, but a display of fire power encouraged many of the Indians to move away. Between Big Pine and Bishop, one Paiute separated a steer from the herd, and he was soon killed for rustling. Shortly thereafter, in roughly the same locale, the Indians retaliated by killing a white man; his scalp was later found near Big Pine (Chalfant 1933:148).

By the end of January 1862, a meeting of the Americans and the Indians occurred at San Francis Ranch, with Chief George, Chief Dick, and Chief Little Dick representing Tribal interests, resulted in a treaty of peace that lasted less than 2 months. Chalfant describes the events well, and it is worth the reading, but the shortened version is that the Bishop Creek Indians held a war dance around Bishop's house. The next day, the Paiute diverted some 200 head of cattle, and the back and forth attacks began. The Owens Valley Natives called for help from their neighbors, and there is a great deal of speculation and confusion about who showed up, but most accounts suggest it was western Sierra Natives including Tulare and Kern county natives (who had recently gone through their own battles).

Altercations took place up and down Owens Valley, and indeed, the entire eastern side of California, as reported by the acting Indian Agent for Nevada Territory, Warren Wasson who wrote to the governor March 25, 1862: "Indian difficulties on Owens River confirmed. Hostiles advancing this way. I desire to go and if possible, prevent the war. If a few poorly armed men go up against those Indians, defeat will follow… If the whites on Owens River had prompt and adequate assistance it could be checked there. I have just returned from Walker River. Piutes alarmed" (Chalfant, 1933:161).

Wasson began his journey to Owens River, stopping along the way at several locations, including Mono Lake where Indians had begun preparations for a war. Pleased to learn that Wasson was on a purported mission of peace, they sent with him a Native who spoke the "Owens River Piute dialect" (Chalfant 1933:162). They reached the Owens River on April 6th, a little too late.

Lieutenant Colonel George S. Evans arrived in early April 1862 (Davis et al., 1897) to find that a battle had occurred at Lone Pine and at Fort Independence settlers were said to be within the fort due to the destruction and burning of their homes. In the first week of April 1862, Evans described a battle between the "badly whipped [Americans, and]…the Indians, numbering some 400 or 500, a great many of them with good fire-arms, [who] had come out of the canyons and mountain ravines" (Davis et al., 1897; Red Bluff Semi-Weekly Independent, 9 May 1862). Evans soon increased his estimate of the opposition numbers to 500-700 Indians who he said were positioned in the rocks in a canyon above

"Bishop's Creek." Although he endeavored to defend his position, he *"saw that it would be madness and no less than murder to attempt to go any farther; that I could do nothing but get half of my men killed without as much as getting a fair shot at an Indian…After returning to the horses and trying for some time without avail to get the Indians out into the valley, I fell back to Bishop's Creek"* (Davis et al., 1897:48).

Chalfant suggested that the Indian stronghold was a black butte in the valley across Bishop Creek; this perhaps was in the area of the present Coyote Valley Road or more likely, the small "butte" between Magee and Birch creeks to the west of Bishop. The white intruders were quickly outnumbered and hid in what has been called "a ditch" (Chalfant 1933:159). Evans soon met up with Wasson's group, which Chalfant (1933:163) documents as 6 miles south of Bishop Creek (a mile or two north of Keogh Hot Spring). Evans was senior to Wasson and ordered all of the men back into Bishop Creek where one flank was on the hillside of the drainage, one on the opposite side (Sand Canyon) and one in the middle. It was not long before all recognized they were outnumbered and began a retreat. Chalfant (1933:165) says that Evans group retreated a mile and a half back towards Bishop, and the place where they had been, was immediately "dotted with Indian campfires."

Evans' (Davis et al., 1897a:146) letter report to headquarters represented what seems to be the Indian point of view in 1862: "The Indians claim the valley as belonging to them, and still insist upon it that no white man shall settle, or as they term it, sit down in the valley. They say that the whites may pass through to and from Aurora if they want to, or they may locate in the hills and work the mines, but must not sit down on the grass patches." By "sitting down on the grass patches," it is likely that the Native people were speaking both of the cattle grazing and settlement.

Evans recorded that the Indians subsisted "entirely upon the grass seeds and nuts gathered in the valley from the [Owens] lake up," along with other foods (Davis et al., 1897a:146). Wasson, in a letter back to Governor Nye of Nevada wrote that the Indians "had dug ditches and irrigated nearly all the arable land in that section of the country, and live by its products" (Chalfant 1933:166), further evidence of early ditch irrigation.

As newspapers of the time attest, American settlers began to retaliate and prevail while the US Army began a systematic destruction of Owens Valley Paiute foodstuffs and lifeways. In July 1863 Fort Tejon was reestablished. By trickery, the Owens Valley Paiute were invited to a big feast, but instead were corralled at Independence and 1100 Natives, by forced march, were taken to San Sebastian Reservation, near Fort Tejon, in July 1863. Nine hundred and eight Indians arrived there at San Sebastian, with nearly 200 having escaped or died enroute.

Jack Stewart recalled that he had been hunting and returned to Big Pine but found "that the soldiers had rounded up all the Indians at Fort Independence and then driven them southward over Tejon pass so that there were scarcely any of my people in the valley" (Steward 1934:429; Davis-King 2003 provides a deeper description of these events). To this day, the Native people remember their ancestors and commemorate the Forced March as a significant part of their Tribal history.

By the time the Owens Valley Natives were able to escape Sebastian, or otherwise return home, the non-native people had overtaken the prime waters and grazing lands of the area, overlapping the former village and agricultural plots. Inyo County was established in 1866 from portions formerly part of Tulare and Mono counties. The first land patents were filed that same year (Inyo County Assessor's Office Official Records). Ranch lands were divided, and the Indians who had endured the years of disease, starvation, murder, indentured servitude, numerous battles and skirmishes, and removal to reservations, now survived in part by attaching themselves to the workforce of the Anglo population, becoming cowboys, cooks, washers, woodcutters, maids, ranch hands, and laborers. Ironically, the impetus of the battles in the first place, the bringing of cattle through Owens Valley to the mines, was now to be a source of Paiute survival.

Native men began working with cattle and riding horses, becoming excellent range managers. They delivered goods and mail or cared for large bodies of grazing land. Women became laundresses throughout the valley in the early years, supplanted by the washing machine only after World War II. They also cleaned and took care of children in Anglo homes. In spite of the attachment to Anglo families, native traditions, language, and culture survived. Pinenut harvests for example, took Native men and women from their employment, as all would gather in the hills to gather and store this important food.

Since the 1850s there has been discussion regarding creation of a large Owens Valley reservation, but this never happened. Fort Independence was established in 1902, Bishop and Big Pine in 1912, Benton in 1915, Lone Pine Reservation in the late 1930s, and Timbisha as recently as 1982. As the federal government constructed homes for the Native people, built irrigation and consumptive water systems, and undertook the construction of roads within the tribal land, people began moving onto trust lands, for protection and proximity to relatives and friends. Cultural continuity in language, dance and ceremony, food, some medicines, and general social patterns has continued and enriches tribal perspectives.

In describing the past of the people who lived in this region, it is increasingly important to remember the people who are still here. The Bishop Paiute Tribe, the fifth largest in the state of California, remains a vibrant and active part of the eastern Sierra community focusing on education, community development, health, and protection. Traditional activities, such as hunting, gathering medicines and foods like piagi and pinenuts, fishing, and the irrigation of taboose remain important components of Bishop Paiute life, supported by several Tribal programs. The Owens Valley Paiute-Shoshone Cultural Center promotes activities including the Tribe’s Food Sovereignty Program to encourage the community’s use of their organic garden and market, honoring of the gifts of the earth through ceremonial dance (the spring and fall pinenut dances, for example), elders’ programs including field trips with Tribal youth, language rejuvenation and more. These are but some of the Tribal programs that connect the community with their past and their future. The other tribes surrounding the Bishop Creek Project are similarly connected to their heritage through gathering, hunting, ceremony, language, cultural revitalization, interaction with neighboring groups, and more.

8.13.5 Current Cultural Resource Management

As part of the previous relicensing, SCE prepared a document entitled Management Plan for Historic and Archaeological Resources Associated with the Historic and Archaeological Preservation Plan for the Bishop Creek Hydroelectric Project (FERC Project 1394), Inyo, California (White 1989). The plan identifies specific measures to be undertaken by SCE to avoid adverse impacts to the NRHP-eligible properties located within the Bishop Creek Project boundary and various programmatic measures that SCE was required to implement. Monitoring and documentation of the NRHP-eligible resources within the Bishop Creek Project FERC boundary was required to be conducted in three 5-year increments to determine the success of those measures and to evaluate the need for additional treatment. There was no stated provision for consultation with Tribes or getting Tribal input on management.

8.13.6 Tribal Resources Identified to Date

Two property types (district and site) were documented as four main resource categories identified in the Bishop Creek Project area: Traditional Cultural Landscape (TCL); Ethnobiological Place; Transportation Corridors; and Ethnohistoric Site.

Due to COVID-19 restrictions, interviews with Tribes and Tribal experts were limited. Ten interviews regarding the Bishop Creek Project or Project area were conducted, but additional interviews are anticipated when the Tribes review the present document.

To date, six resources of potential value to local tribes have been identified:

1) Tribal Place 1: TCL District related to the Bishop Creek Battle. Portions are located in the APE.

2) Tribal Place 2: TCL District related to a complicated and relatively intact irrigation network. Portions are located within the APE.

3) Tribal Place 3: TCL area/site, within the APE.

4) Tribal Place 4: Ethnographic Transportation Corridor (contributor to a District); partially within APE.

5) Tribal Place 5: Ethnographic Transportation Corridor (contributor to a District); partially within APE.

6) Tribal Place 6: A presumed ethnohistoric residential site.

8.13.7 Potential Adverse Effects And Issues

FERC's decision to issue a new license is considered an "undertaking" pursuant to 36 CFR 800.16(y), and the NHPA requires federal agencies to consider the effect of undertakings on historic properties and provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Bishop Creek Project O&M could potentially affect Tribal resources, TCPs, and other resources of traditional, cultural, or religious importance to the Native American community.

8.13.7.1 Effects of Continued Project Operation on Tribal Resources

Direct effects related to the Bishop Creek Project include construction and O&M of Project facilities or features within or adjacent to cultural and Tribal resources, including archaeological sites. Examples include maintenance on the penstocks and flowlines which may cross resource boundaries or wave action on shoreline sites and archaeological deposits as reservoir levels fluctuate. No Project-related effects were identified on free flowing portions of Bishop Creek.

Other direct effects consist of those posed by activities associated with non-project related infrastructure, development, and recreational use. Examples of infrastructure include transmission lines, the alignments of which cross the APE but are not associated with the Bishop Creek Project. Situated within public lands managed by the BLM and INF, much of the APE is utilized recreationally by the public, on foot, on horseback, in off-highway vehicles, and in boats. Examples of USFS facilities overlapping or adjacent to the APE include campgrounds, comfort stations, parking areas, and hiking trails. Evidence of recreational use extending into Tribal resource areas include designated hiking trails, social pedestrian tracks deviating from established trails, modification to plants, community gathering of artifacts and modification to earthworks, and use of traditional areas as toilet facilities. As access to the roads within the APE is not limited to Project personnel, their presence within and adjacent to Tribal and cultural resources, including archaeological sites, is identified as a non-project related effect.

8.13.7.2 Consistency with the Inyo National Forest Land Management Plan

SCE has reviewed the desired conditions for Tribal resources in the INF Land Management Plan for consistency with the Bishop Creek Project (USDA 2019). The desired conditions relating to tribal resources, with which the Bishop Creek Project is consistent, include:

- TRIB-FW-DC 03: Native Americans have access to areas that provide them an opportunity to practice traditional, cultural, and religious lifeways, such as plant gathering, fishing, hunting, and ceremonial activities that are essential to maintaining their cultural identity and the continuity of their culture.

- TRIB-FW-DC 04: Traditional ecological knowledge is a valued part of the process when developing and implementing restoration projects and other national forest programs.

- CULT-FW-DC 02: Cultural resources, traditional cultural properties, and sacred sites are protected through project design and consultation with Indian Tribes, Tribal cultural leaders, and consulting parties.

8.13.8 Proposed Mitigation and Enhancement Measures

SCE currently implements a Cultural Resources Management Plan, and intends to develop a Historic Properties Management Plan (HPMP) for the Project (PME-9, Appendix A). The HPMP will consider the direct and indirect effects of continued Project O&M on the National Register of Historic Places (NRHP) listed or eligible Resources, including public recreation activities, that may have an adverse effect on historic properties.

The purpose of identifying effects is to determine which resources may have heritage values compromised or altered, and to aid in the development of management/protection measures that would be incorporated into the HPMP for the Bishop Creek Project. Tribes have yet to see the Tribal Places identified, and have not had an opportunity to contribute information, and their thoughts on the Bishop Creek Project effects, or other matters related to integrity and significance of their resources are not detailed in this DLA. PME measures are in review with SCE, Tribes, agencies, and the SHPO. This information will be incorporated into the FLA once review and agreement have been completed.

8.13.9 References

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9.0 DEVELOPMENTAL ANALYSIS

This section addresses the electric power benefits of the Bishop Creek Project; summarizes the cost, power value, and net benefit for each of the licensing decision alternatives; and provides the estimated cost for each of the environmental measures proposed or recommended for inclusion in a license. Consistent with the FERC approach to economic analysis, the power benefit of the Bishop Creek Project is determined by estimating the cost of obtaining the same amount of energy and capacity using the likely alternative generating resources available in the region. In keeping with FERC policy as described in 72 FERC ¶ 61,027 (July 13, 1995), this economic analysis is based on current electric power cost conditions and does not consider future escalation of fuel prices in valuing the Bishop Creek Project's power benefits. In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

This section includes: an estimate of the net power benefit of the Bishop Creek Project for each of the two licensing alternatives (No-Action and Proposed Action); and an estimate of the cost of individual PME measures considered in the EA. To determine the net power benefit for each of the licensing alternatives, Bishop Creek Project costs are compared to the value of the power output as represented by the cost of a likely alternative source of power in the region. For any alternative, a positive net annual power benefit indicates that the Bishop Creek Project power costs less than the current cost of alternative generation resources and a negative net annual benefit indicates that Bishop Creek Project power costs more that the current cost of alternative generation resources. This estimate helps support an informed decision concerning what is in the public interest with respect to a proposed license.

9.1 POWER AND ECONOMIC BENEFITS

Table 9.1-1 summarizes the assumptions and the economic information used in the analysis.

Note: This section will be substantively updated for the Final License Application.

Table 9.1-1. Parameters for Economic Analysis of the Bishop Project

Parameter	Value
Taxes	$241,900
Federal Income Tax Rate	$21%
State income tax rate	8.84%
Levy rate for Inyo County	7.75%
Insurance (SCE is self-insured)	N/A
Net investment (2020), $[a]	30,138,243
Original cost (2020), $	72,452,274
Future major operations capital cost, $[b]	*To be included in Final License Application*
Relicensing implementation capital cost, $[c]	*To be included in Final License Application*
Relicensing cost, $[d]	*To be included in Final License Application*
Routine O&M, $/year[e]	$3,959,042
New and non-routine O&M, $/year[f]	*To be included in Final License Application*

Parameter	Value
Annual fees, $/year[g]	$93,910

[a] Net investment, or net book value, is the depreciated Project investment allocated to power purposes. Reported as of the end of 2020.
[b] Future major capital costs included major plant rehabilitation to maintain present-day capability scheduled from 2022 through 2063 and are expressed in non-inflated dollars.
[c] Implementation capital costs include the cost of construction of new capital PM&E measures such as the proposed ongoing buffer and vegetation monitoring and new avian and orchid cooperative monitoring, bank stabilization, and recreation site upgrades.
[d] relicensing costs include the administrative, legal/study, and other expenses to date or budgeted to complete the license process.
[e] Existing plant O&M does not include O&M related to PM&E measures associated with the current license.
[f] new and non-routine O&M includes PM&E measure operation, dam safety, and recreation and other PM&E measure maintenance.
[g] Annual fees paid under part I of the FPA are based on the nameplate capacity of the Project.

As currently operated, the Bishop Creek Project generates an average of 129,887 MWhs annually (since issuance of the current license from 1994 to 2020) and has an installed capacity of 28.9 MW.

Table 9.1-2. Revenue Considerations

Item	Nominal Value (2020$)
Dependable Operating Capacity (MW)	29.2
Average Annual Energy Production (MWh)[1]	116,593
Annual Energy Production Benefit ($)[2]	$4,775,659
Annual Capacity Benefit ($)[3]	$1,212,384
Gross Annual Benefit ($)	$5,988,043

[1] 20-yr average generation (2001-2020)

[2] http://www.caiso.com/Documents/AgendaandPresentation-2019AnnualReportonMarketIssuesandPerformance-Jul62020.pdf

[3] https://www.cpuc.ca.gov/RA/

9.2 COMPARISON OF ALTERNATIVES

Table summarizes the annual cost, power benefits, and annual net benefits for the No-Action Alternative and the Proposed Action. Bishop Creek Project costs and benefits are presented in Exhibit D, Statement of Costs and Financing, and Exhibit H, Project Management and Need for Power.

Table 9.2-1. Summary of the Annual cost, Power Benefits, and Annual net Benefits for the No-Action and Proposed Action

	No Action	Proposed Action
Installed capacity (MW)	28.9	*To be included in Final License Application*
Average annual generation total (MWh)[a, b, c]	129,887	*To be included in Final License Application*
Average annual energy value ($/MWH)	$42.41	*To be included in Final License Application*
Average annual O&M cost ($)[a]	$3,892,811	*To be included in Final License Application*
Subtotal of Nominal Levelized Cost (based on annual OM costs ($/MWh))	$29.97	*To be included in Final License Application*
Annual net benefit (Value of project power)	$5,508,508	*To be included in Final License Application*

[a] Annual averages over the most recent 5-year period (2015-2020)
[b] Generation totals do not include spinning reserve. See Exhibit D for more detail.
[c] Since issuance of the current license (1994-2020)

Under both the No-Action Alternative and the Proposed Action, the Bishop Creek Project would have an installed capacity of 28.9 MW and generate an average of 129,887 MWhs of electricity annually, currently valued at approximately 42.41 per MWh. The direct annual O&M Project cost is currently valued at approximately $3,892,811 (2016-2020). *An estimate of the average annual O&M cost will be included in the FLA for the Proposed Action. Similarly, an estimate of the annual levelized Bishop Creek Project cost will be included in the FLA.*

The FLA will include a levelized annual net benefit (or cost) statement. The Proposed Action would result in the environmental benefits that accompany implementation of the PME measures described in Table . SCE would continue to operate the Bishop Creek Project as a dependable source of renewable electrical energy for its customers.

Implementation of the Proposed Action would provide favorable customer benefits over the Bishop Creek Project decommissioning. Bishop Creek Project decommissioning was not considered and dismissed from detailed analysis.

9.3 Cost of Environmental Measures

[This section is a placeholder that will be populated as part of the FLA, after environmental measures are finalized based on any additional stakeholder input received on environmental measures presented in the DLA.]

Table provides the capital cost and O&M costs of each of the proposed PME measure considered in the analysis with the PME costs also presented in Exhibit D.

Table 9.3-1. Cost of PME Measures Considered in Assessing the Environmental Effects of Continuing to Operate the Bishop Project

PME Measure ID	Measure Name	Capital Cost	O&M Cost
PME-1	Minimum Instream Flows	$	*To be included in Final License Application*
PME-2	Gaging Plan	$	
PME-3	Sediment Management Plan	$	
PME-4	Stocking Plan	$	
PME-5	Wildlife Resources Management Plan	$	
PME-6	Botanical Resources Management Plan	$	
PME-7	Invasive Species Management Plan	$	
PME-8	Recreation Resources Management Plan	$	
PME-9	Historic Resources Management Plan	$	
PME-10	Invasive Mussels Protection Plan	$	

9.4 AIR QUALITY

No substantial new construction is proposed for the Bishop Creek Project, including any construction activities that would create air quality concerns. Air quality was not raised as an issue during the scoping process. As such, this section is not required as part of the analysis.

10.0 CONCLUSIONS AND RECOMMENDATIONS

This section compares the developmental and non-developmental effects of the Proposed Action and the No-Action Alternative for the Bishop Creek Project; identifies the recommended alternative; summarizes unavoidable adverse effects; discusses the recommendations of fish and wildlife agencies; and describes the Bishop Creek Project's consistency with comprehensive plans.

10.1 COMPARISON OF ALTERNATIVES

This section includes a comparison of the developmental and non-developmental effects (resource conditions) resulting from operation and maintenance of the Project under the Proposed Action and the No-Action Alternative.

10.1.1 PROPOSED ACTION

Overall, the Proposed Action protects and enhances resource conditions in the vicinity of the Bishop Creek Project. The key consideration in developing the Proposed Action was to ensure that future operation and maintenance of the Project protects power generation, consumptive water supply, and system capability and reliability, while maintaining and enhancing environmental and cultural resources in the Project vicinity. Resource effects under the Proposed Action are described in detail in Section 8.0 – Environmental Analysis Report. Under the Proposed Action, ongoing Project O&M activities will be memorialized in environmental measures; management and monitoring plans; and programs (collectively referred to as measures) which are designed to protect, maintain, or enhance environmental and cultural resources over the term of the new license (Appendix A). The proposed measures include new resource protection measures compared to the No-Action Alternative. The Project's annual average energy generation (1991–2019) under the No-Action Alternative is 246,271 MWh megawatt-hours (MWh); and it is estimated that the annual average energy generation under the Proposed Action will be 246,271 MWh [*Note: this number may be updated for the Final License Application after consultation with stakeholders, which may be impacted by changes in O&M procedures to manage sediments (Appendix A, PME-3)*]. The Proposed Action results in a benefit to resources compared to the No-Action Alternative, as identified below.

The Proposed Action anticipates that the Final PME measures, to be included in the Final License Application will result in benefits to resources compared to the No-Action Alternative, as described below:

Water Use and Hydrology

- Protects historic consumptive water user's water supply.
- Maintains existing water uses and rights.
- Maintains beneficial uses as defined by Lahontan Regional Water Quality Control Board and the Basin Plan.

Aquatic Resources

- Maintains instream flow conditions in support of resource management objectives.
- Provides an improved mechanism for supplying sediment to downstream reaches through periodic flow releases.

Botanical Resources and Wildlife Resources

- Facilitates alternate mechanisms of reproduction for certain cottonwood species through flushing flows.
- Reduces the potential spread or introduction of non-native invasive plants, and addresses spread Black Locust.
- Protects populations of concern
- Maintains/enhances habitat for riparian special-status plants and riparian nesting birds.
- Maintains protective measures and habitat connectivity for special-status and game mammals along Project flowlines (i.e., flowline crossings, water guzzlers).

Geomorphology

- Provides source of sediment to bypass reaches to benefit aquatic habitat.

Land Use and Management

- Ensures that only land that is necessary for operation and maintenance of the Project is encompassed by the FERC Project boundary.
- Maintains consistency with established land management plans and policies, and land use designations.
- Maintains consistency with the Land Management Plan for the INF.
- Corrects mapping inconsistencies for better administrative management of forest resources.

Recreation

- Maintains recreational opportunities by maintaining minimum flows and continuing stocking agreements with CDFW.
- Ensures public access to Project-induced recreation facilities.

- Incorporates necessary lands within the Project boundary for Project-induced recreation purposes.

Aesthetic Resources

- Continues to enhance visual quality by providing minimum instream flows and maintaining/enhancing riparian habitat and water quality, which are associated with scenic quality.

Cultural and Tribal Resources

- Establishes clear protocols for protection and management of cultural and tribal resources, including protection, identification, and NRHP evaluation.
- Establishes protocols for environmental review of Project O&M activities to ensure protection of historic properties.
- Maintains public and worker education.
- Requires periodic resource condition monitoring and reporting.

Socioeconomics

- Maintains the local/regional economy and local/state tax revenue.

10.2 Unavoidable Adverse Impacts

There are no unavoidable adverse effects to environmental resources as a result of implementation of the Proposed Action (refer to Section 8.0 – Environmental Analysis).

10.2.1 Recommendations of Fish and Wildlife Agencies

The Proposed Action considers input from federal and state resource agencies, Native American Tribes, non-governmental organizations, and members of the public (collectively referred to as Project stakeholders) acquired during consultation activities completed for relicensing of the Project. No formal recommendations from fish and wildlife agencies have been submitted to date. Therefore, the Proposed Action represents only SCE's recommended protection, mitigation, and enhancement measures.

10.3 Consistency with Comprehensive Plans

This section presents how the Bishop Creek Project would, or would not, comply with comprehensive plans.

10.3.1 Comprehensive Waterway Plans

Section 10(a)(2)(A) of the FPA, 16 USC Section 803 (a)(2)(A), requires FERC to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the Project. On April 27, 1988, FERC issued Order No. 481-A, revising Order No. 481, issued October 26, 1987, establishing that FERC will accord FPA Section 10(a)(2)(A) comprehensive plan status to any federal or state plan that: 1) is a comprehensive study of one or more of the beneficial uses of a waterway or waterways; 2) specifies the standards, the data, and the methodology used, and 3) is filed with the Secretary of the Commission.

FERC currently lists 110 comprehensive management plans for the state of California, of which the following 13 comprehensive plans pertain to waters in the vicinity of the Bishop Creek Project (FERC 2021); no inconsistencies between these plans and the Proposed Action were found (Table 10.3-1).

- Bureau of Land Management. 1993. Bishop Resource Management Plan. Department of the Interior, Bishop, California. April 1993.
- California Department of Fish and Game. 1996. Steelhead Restoration and Management Plan for California. Sacramento, California. February 1996.
- California Department of Fish and Game. 2003. Strategic Plan for Trout Management: A Plan for 2004 and Beyond. Sacramento, California. 2003.
- California Department of Fish and Game. US. Fish and Wildlife. 2010. Final Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement. Sacramento, California. 2010.
- California Department of Fish and Wildlife. 2008. California Aquatic Invasive Species Management Plan. Sacramento, California. January 18, 2008.
- California Department of Parks and Recreation. 2012.* Public Opinions and Attitudes on Outdoor Recreation in California. Sacramento, California.
- California Department of Parks and Recreation. California Outdoor Recreation Plan (SCORP). Sacramento, California. April 1994.
- California State Water Resources Control Board. 1975. Water Quality Control Plan on the Use and Disposal of Inland Waters Used for Power Plant Cooling. Sacramento, California. June 1975.
- California State Water Resources Control Board. 2015. Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) Plan: Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. Sacramento, California. April 2015. Amended May 2017 and August 2018.
- California State Water Resources Control Board. 2016. Water Quality Control Plan for the Lahontan Region. South Lake Tahoe and Victorville, California. January 2016.

- Forest Service. 2004. Sierra Nevada National Forest Land and Resource Management Plan, Amendment. Department of Agriculture, Vallejo, California. January 2004.
- Forest Service. 2019*. INF Land and Resource Management Plan. Department of Agriculture, Bishop, California. October 2019.
- U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.
- U.S. Fish and Wildlife Service. n.d. Fisheries USA: The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C.

10.3.2 Relevant Agency Resource Management Plans

In addition to the waterways comprehensive plans listed above, some agencies have developed resource management plans (RMPs) to help guide their actions regarding specific resources of jurisdiction. The agency RMPs[31] listed below may be relevant to the Bishop Creek Project and may be useful in the relicensing proceeding for characterizing desired conditions:

- Forest Service. 2004. Sierra Nevada National Forest Land and Resource Management Plan, Amendment. Department of Agriculture, Vallejo, California. January 2004[32].
- Bureau of Land Management. 1987. Final Environmental Impact Statement for 19 Wilderness Study Areas within the Benton-Owens Valley and the Bodie-Coleville Study Areas. Department of the Interior, Bakersfield, California.
- California Department of Fish and Game. 2015. California State Wildlife Action Plan: A Conservation Legacy for Californians, Plan Update. California's State Wildlife Action Plan. Sacramento, California. 2015
- Forest Service. 1989. Mono Basin National Forest Scenic Area Comprehensive Management Plan. Department of Agriculture, Bishop, California.

[31] SCE has listed the most recent versions of these resource management plans. To the extent these plans may supersede previous plans filed with the FERC, these are denoted with a * symbol

[32] Although no portion of the Project is located on Sierra Nevada National Forest lands, the 2004 Land and Resource Management Plan was reviewed as contiguous lands bordering the Inyo National Forest, which abuts the Project Boundary, are under the jurisdiction of the Sierra Nevada National Forest.

- Forest Service. 2004. Sierra Nevada National Forest Land and Resource Management Plan, Amendment. Department of Agriculture, Vallejo, California. January 2004.

- National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington D.C. 2016.

- U.S. Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan. Department of the Interior. Environment Canada. May 1986.

Table 10.3-1. Relevant Comprehensive Management Plans

Comprehensive Plan Name			**Relevant Plan Goals and Objectives**	**Applicability to Project**	**Project Compatibility**
Agency	Plan	Year			
CDFG	Steelhead Restoration and Management Plan for California	1996	Restoration of California's anadromous fish populations by: • Significantly increasing the natural production of salmon and steelhead by the end of the century • Doubling naturally spawning anadromous fish populations by the year 2000	There are no anadromous fish in the Project area and Project waters do not affect downstream management of anadromous resources.	The Bishop Creek Project is compatible with the Steelhead Restoration and Management Plan for California. The focal area for this plan is the North Coast, Central Valley, and South Coast rivers/streams.
CDFG	Strategic Plan for Trout Management: A Plan for 2004 and Beyond	2004	Provides diverse angling and recreational opportunities	The networks of creeks and reservoirs in Bishop Creek Project support both stocked and self-sustaining non-native trout fisheries, including brown trout, brook trout, and rainbow trout.	Bishop Creek Project reservoirs are heavily utilized by angling recreationists throughout the fall, spring, and summer. (See Section *8.5* of this Exhibit E)
CDFG; USFWS	Final Hatchery and Stocking Program Environmental Impact Report/Environmental Impact Statement.	2010	Continue rearing and stocking of fish from existing hatchery facilities for the recreational use of anglers Mitigation of habitat loss due to dam construction and blocked access to upstream spawning areas	The networks of creeks and reservoirs in Bishop Creek Project support both stocked and self-sustaining non-native trout fisheries, including brown trout, brook trout, and rainbow trout. Bishop Creek Project consists of several impoundments due to construction of Project facilities.	Bishop Creek Project reservoirs are heavily utilized by angling recreationists, thereby supporting the Plan goal. (See Section 8.5 of this Exhibit E) Existing Articles in the current Bishop Creek Project license address mitigation for fish and wildlife resources. Such measures are expected to

Comprehensive Plan Name			Relevant Plan Goals and Objectives	Applicability to Project	Project Compatibility
					continue into the new license.
CDFW	California Aquatic Invasive Species Management Plan	2008	Minimize and prevent the introduction and spread of aquatic invasive species into and throughout the waters of California	The extensive network of waterways and reservoirs and multiple public access launch ramps presents a risk of introduction of AIS into Bishop Creek Project waters.	SCE personnel have not reported any sightings or indications of aquatic invasive species. SCE has developed a quagga and zebra mussel prevention plant to address the vulnerability of invasion.
SWRCB	Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries (ISWEBE) of California	2015; 2017; 2018	Trash shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance Sport Fish Water Quality Objectives for mercury applies to waters with the beneficial uses of COMM, CUL, WILD, or MAR1 Bacteria Water Quality objectives for waters with REC-1 beneficial use	Trash and waste may be generated from recreationists, and project operations staff while in the Bishop Creek Project boundary. Water bodies within the Project have beneficial use designations as COMM and WILD Water bodies within the Bishop Creek Project have beneficial use designations of REC-1	Developed recreation sites within and adjacent to the Bishop Creek Project provide receptacles for trash. Waste removal is coordinated with the INF and Inyo County. As part of the relicensing process, a water quality study was undertaken to assess Bishop Creek Project waters. Draft results of the study are provided in Volume 3 of the DLA.
SWRCB	Water Quality Control Plan for the Lahontan Region. South Lake Tahoe and Victorville,	2016	Water Quality Objectives that apply to all surface waters Water Quality Objectives for the Owens and Mono Hus	Waterbodies within Bishop Creek Project fall within the jurisdiction of the Lahontan Regional Water Quality Control Board	As part of the relicensing process, a water quality study was undertaken to assess Bishop Creek Project waters. Results of

Comprehensive Plan Name			Relevant Plan Goals and Objectives	Applicability to Project	Project Compatibility
	California (Basin Plan)		Water Quality Objectives for Fisheries Management Activities		the study are provided in Volume 3 of the DLA.
USFWS	The Recreational Fisheries Policy of the USFWS	n.d.	To conserve, restore and enhance aquatic systems to provide for increased recreational fishing opportunities nationwide	The networks of creeks and reservoirs in Bishop Creek Project support both stocked and self-sustaining non-native trout fisheries, including brown trout, brook trout, and rainbow trout	Bishop Creek Project reservoirs are heavily utilized by angling recreationists throughout the fall, spring, and summer. (See *Fish & Aquatic Resources*, and *Recreation and Land Use* in this Exhibit E)
USFWS; Canadian Wildlife Service	North American Waterfowl Management Plan	1986	Protection of waterfowl and their habitats requires long-term planning and the close cooperation and coordination of management activities by Canada, Mexico, and the United States within the framework of the 1916 and 1936 Migratory Bird Conventions	Wildlife, including waterfowl, utilize Bishop Creek Project waterbodies throughout the year	As part of the relicensing process variety of sources were reviewed for information on special status wildlife. Additionally, a general wildlife study was performed in 2019 and 2020. Results of the wildlife study, including birds and waterfowl encountered, are included in Volume 3 of the DLA.
NPS	The Nationwide Rivers Inventory	2016	The NWI is a listing of more than 3,200 free-flowing river segments in the U.S. that are believed to possess one or more “outstandingly remarkable” natural or cultural values judged to be at least regionally significant, and hence, are potential candidates for inclusion in the National Wild and Scenic River System	No segments of waters within the Bishop Creek Project are listed in the NWI, nor listed as potential candidates for inclusion in the National Wild and Scenic River System	Should any segments of Bishop Creek Project waters be listed in either the NWI or the National Wild and Scenic River System, SCE will adhere to all regulatory requirements

Comprehensive Plan Name			**Relevant Plan Goals and Objectives**	**Applicability to Project**	**Project Compatibility**
USFS	Inyo National Forest Land and Resource Management Plan	2019	Desired Conditions for Ecological Sustainability and Diversity of Plant and Animal Communities Desired Conditions for Social and Economic Sustainability and Multiple Uses	Land ownership within and adjacent to the Bishop Creek Project is predominantly composed of federal lands jointly administered by the INF and BLM; a small portion of INF lands within the Bishop Creek Project boundary are managed as a National Wilderness Area (John Muir Wilderness)	SCE coordinates with the INF to operate the Bishop Creek Project in a way that is consistent with the relevant desired conditions and guidelines described in the INF Land and Resource Management Plan. Resource-specific desired conditions and guidelines as applicable to the Bishop Creek Project are discussed in the Environmental Analysis provided in this Exhibit E and in the technical reports provided in Volume 3 of the DLA.
CDPR	Public Opinions and Attitudes on Outdoor Recreation in California	2012*	An understanding of the outdoor recreation demands, patterns, preferences, and behaviors of California residents is essential to develop policies, programs, services, access, and projections of future use	Land ownership within and adjacent to the Bishop Creek Project is primarily composed of public lands administered by the INF and BLM	SCE coordinates with the INF to ensure access to recreation (fishing, boating, camping) sites within and adjacent to the Bishop Creek Project boundary.
CDPR	California Outdoor Recreation Plan (SCORP)	2020	Land trusts and community organizations often own publicly accessible preserves and neighborhood parks or partner with public agencies to offer programs and services. The health sector, foundations, and business contribute funding and the people of California volunteer time and resources to support parks.	Land ownership within and adjacent to the Bishop Creek Project is primarily composed of public lands administered by the INF and BLM	SCE coordinates with the INF to ensure access to recreation (fishing, boating, camping) sites within and adjacent to the Bishop Creek Project boundary

Comprehensive Plan Name			**Relevant Plan Goals and Objectives**	**Applicability to Project**	**Project Compatibility**
CDFG	California State Wildlife Action Plan: A Conservation Legacy for Californians, Plan Update	2015	Maintain and improve connectivity vital for sustaining ecosystems (including those relevant to vegetation, wildlife corridors, genetic permeability, water flow, floodplains [longitudinal and lateral] and groundwater) Maintain and improve water quality (including temperature, chemistry, and pollutant/nutrient concentrations and dynamics) and water quantity and availability vital for sustaining ecosystems and their attributes (including ocean, lakes, rivers, streams, groundwater, and snowpack) Maintain or improve hydrological regimes vital for sustaining ecosystems (including riverine, lacustrine, and estuarine hydrodynamics)	Bishop Creek Project lands and surrounding areas are primarily rural or forested in character and provide migratory and permanent habitat for a wide range of species There is very little development tin the Bishop Creek drainage; more than one-half of the drainage is in the John Muir Wilderness and much of the remainder is the INF	The intermixing of the vegetation communities in the Bishop Creek Project area provides complex habitat allowing wildlife to utilize many different plant communities throughout a great range of elevations The Bishop Creek Project has no existing or proposed consumptive uses of water for Bishop Creek except for minor domestic use by employees at Project facilities. Although water is stored in upstream reservoirs for power generation, there is no long-term net loss of water to downstream areas.
BLM	Bishop Resource Management Plan	1993	Owens Valley Management Area Management Themes: manage for the full spectrum of uses. Emphasize recreational use and environmental education while providing for land disposals.	Land ownership within and adjacent to the Bishop Creek Project is predominantly composed of federal lands jointly administered by the INF and BLM	SCE coordinates with the INF and BLM to operate the Bishop Creek Project in a manner consistent with multiple uses, including recreational use and environmental education. The Recreation and Land Use section of Exhibit E provides additional information regarding use of Bishop Creek Project and adjacent federally managed lands.

Comprehensive Plan Name			**Relevant Plan Goals and Objectives**	**Applicability to Project**	**Project Compatibility**
BLM	Final Environmental Impact Statement for 19 Wilderness Study Areas within the Benton-Owens Valley and the Bodie-Coleville Study Areas	1987	Reviewed environmental impacts of potential designation of wilderness study areas	The Bishop Creek Project has some project features in the John Muir Wilderness area, which is not mentioned in this report	The Bishop Creek Project is compatible with this plan, since it is outside the geographic scope of the analysis
USFS	Mono Basin National Forest Scenic Area Comprehensive Management Plan	1989	Establishes management objectives for the Mono Basin scenic area	The Bishop Creek Project is not within the boundaries of this management plan	The Bishop Creek Project is compatible with this plan, since it is outside the geographic scope of the analysis

[1] Beneficial use acronyms:
COMM = commercial or sport fishing, CUL = Tribal Tradition and Culture
WILD = wildlife habitat
MAR = Marine Habitat
REC-1 = water contact recreation

10.4 REFERENCES

Federal Energy Regulatory Commission (FERC). 2021. List of Comprehensive Plans. California. Available online: https://cms.ferc.gov/media/list-comprehensive-plans. Accessed December 21, 2021.

10.5 FINDING OF NO SIGNIFICANT IMPACT

Continuing to operate and maintain the Bishop Creek Project with the recommended environmental measures (including management and monitoring programs) included under the Proposed Action would not be a major federal action significantly affecting the quality of the environment. Implementation of the measures would result in greater resource protection as compared to the No-Action alternatives. These measures are provided in Appendix A (Volume 2).

10.6 CONSULTATION DOCUMENTATION

Consultation that has occurred since the filing of the PAD in May 2019 is included in as Appendix I in Volume 2 of this DLA. This consultation record contains a list of all federal, state, and interstate resource agency, Native American Tribes, or member of the public with which SCE consulted with during development and implementation of the study plans and also in preparation of this DLA. Consultation that occurred through a formal stakeholder engagement process such as site visits, scoping meetings, and the ISR and USR meetings are documented in the FERC Docket. As they became available, and as discussed at the ISR Meeting in November 2020, SCE provided FTR to stakeholders for 60-day review beginning early 2021. Comments and responses to those comments gathered as part of that review process are detailed in the consultation summary section at the end of each FTR, any meetings held for the discussion of those comments is also included in the consultation record. Three Draft Technical Reports are included with Volume 3 of this DLA for the first time to stakeholders. These reports (AQ 5, REC 1, and LAND 1) will be issued separately to the TWGs for a 60-day review period.

The complete log of all consultation, including comments provided on this Exhibit E, will be provided with the FLA. Consultation documents (i.e., emails, memorandums) as listed in the Consultation Log (Appendix I, Volume 2) are available upon request.

