FINAL APPLICATION
FOR AMENDMENT OF LICENSE FOR THE
UPPER AMERICAN RIVER PROJECT
FERC PROJECT NO. P-2101

TO AUTHORIZE THE CONSTRUCTION OF
THE NEW SLAB CREEK POWERHOUSE
AND BOATING FLOW RELEASE VALVE

SACRAMENTO MUNICIPAL UTILITY DISTRICT
August 2014
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1.0 PURPOSE

The Sacramento Municipal Utility District (SMUD) is a political subdivision of the State of California formed pursuant to the Municipal Utility District Act (Cal. Pub. Util. Code §§ 811501, et seq.). SMUD is the existing licensee, and current owner and operator of the Upper American River Project (UARP), Federal Energy Regulatory Commission (FERC) Project No. P-2101. The initial license for the UARP became effective on August 28, 1957. With the release of the new license, SMUD formally applies to FERC for a non-capacity license amendment that will enable SMUD to satisfy increased flow requirements below the UARP’s Slab Creek Dam as required in the new license.

In January 2007, the Relicensing Settlement Agreement for the Upper American River Project and Chili Bar Hydroelectric Project (Settlement Agreement) was filed with FERC. The new UARP license incorporates the 2007 U.S. Forest Service (USFS) Final Terms and Conditions associated with the Settlement Agreement. These terms and conditions require SMUD to make annual and seasonally varying minimum releases at Slab Creek Dam that range from 63 to 415 cfs. They also require SMUD to release whitewater boating flows up to 1,500 cfs from the same dam. Thus, the license amendment process described herein addresses facility improvements needed to comply with increased flow requirements in the new license.

The license amendment proposed in this document is to authorize SMUD to construct a new powerhouse on SMUD-owned land ¼-mile downstream of Slab Creek Dam. The new powerhouse will generate power from the required minimum releases under the new license. Appurtenant facilities, such as a proposed boating flow valve, valve vault, and energy dissipating structure, will be used to achieve the required boating releases of the new license. The New Slab Creek Powerhouse and Boating Flow Valve comprise the Project proposed within this amendment application.

License amendments are governed by FERC regulation 18 CFR 4.200, et seq. Because the proposed Project will result in less than a 15% increase in the UARP’s maximum hydraulic capacity, the Project qualifies as a non-capacity amendment. [18 CFR § 4.201(b).] However, because SMUD is adding a new turbine, FERC regulations require SMUD to follow FERC’s three-stage consultation process. [18 CFR 4.38(iv)(C).] See section 4.2 for a discussion of SMUD’s consultation compliance.

A Draft Non-capacity License Amendment Application (DNLAA) was released prior to the issuance of the new license for the UARP, as part of the pre-filing consultation for license amendment process.

SMUD prepared this Final Non-capacity License Amendment Application (FNLAA) for the Project to satisfy the requirements for an Environmental Assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA), (42 U.S.C. §§ 4321, et. seq.), as well as the NEPA-implementing regulations adopted by the Council on
Environmental Quality (CEQ) and FERC. This FNLAA relies partly on the environmental review of the NEPA document prepared by FERC and the USFS for the UARP relicensing. Tiering off of the existing NEPA review, SMUD has performed additional environmental studies of relevance to the Project.

For purposes of the California Environmental Quality Act (CEQA) (Cal. Pub. Res. Code §§ 21000, et seq.), SMUD will serve as the lead agency and the State Water Resources Control Board (SWRCB) and the California Department of Fish and Wildlife (CDFW), which will also make discretionary decisions related to the UARP license amendment, will be responsible agencies. As in the case of the NEPA review, SMUD’s CEQA review will tier off of the CEQA review for the UARP relicensing.

1.1 Location of the Project

The location of the Project is:

| State: | California |
| Nearby cities: | Camino, Placerville, Folsom, Sacramento |
| County: | El Dorado |
| Stream or other water body: | South Fork of the American River |

1.2 SMUD’s Address and Telephone Number

The physical address, mailing address, and telephone number of SMUD is:

Physical Address: Sacramento Municipal Utility District
6201 S Street
Sacramento CA 95817-1899
Telephone: (888) 742-7683

Mailing Address: Sacramento Municipal Utility District
P.O. Box 15830, MS K203
Sacramento CA 95852-0830

1.3 SMUD’s Authorized Agent

The name and mailing address of the person authorized to act as SMUD’s agent for this application is:

Mr. David Hanson
Project Manager, Hydro Licensing & Permitting
Sacramento Municipal Utility District
P.O. Box 15830, Mail Stop K203
Sacramento CA 95852-0830

New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)

August 2014
2.0 PURPOSE OF ACTION & NEED FOR POWER

2.1 Purpose of Action

The Proposed Action of this license amendment is to supplement the existing Slab Creek Powerhouse of the UARP with a new powerhouse. The new powerhouse, and appurtenant boating release valve facilities, will allow SMUD to comply with minimum and boating release requirements of the new UARP license while increasing overall energy production of the UARP. With a capacity of 2.7MW, the new minimum-release powerhouse will be larger than the existing 0.45 MW minimum-release powerhouse located at the base of Slab Creek Dam. The new powerhouse will generate an average annual energy production of approximately 10.5 GWh. Power production at this powerhouse will provide an increment of renewable energy toward achieving SMUD’s Renewable Portfolio Standards (RPS) goals. SMUD is a member of and performs Balancing Authority operations on behalf of the Balancing Authority of Northern California (BANC). As BANC Operator, SMUD must comply with the requirements of the Western Energy Coordinating Council (WECC) and balance at all times the second-to-second changes in the demand and supply of electrical energy within the BANC area. Adding the New Slab Creek Powerhouse to the UARP will facilitate SMUD’s performance of these valuable services and better ensure that we provide reliable, cost-effective electric service to our customer-owners.

A separate purpose of the Project is to ensure compliance with the timing of measures in the new UARP license related to minimum and boating releases from Slab Creek Dam (see Section 3.3 for full discussion of the new measures). In the new license, SMUD is required to comply with a variable minimum release and whitewater boating flow schedule for the South Fork American River (SFAR) below Slab Creek Reservoir. At present, SMUD’s release valve at Slab Creek Dam is incapable of releasing flows higher than approximately 270 cfs. In recognition of this limitation, the new license allows SMUD to make facility improvements to release up to 415 cfs (the highest required minimum release) by Year 4 of the new license. The new license will also require SMUD to release boating flows up to 1,500 cfs. Currently, spilling water over the dam is SMUD’s only means of implementing boating flows of this magnitude, which introduces issues of precision and boating safety. The new license allows SMUD 15 years to consider development of facility modifications to regulate boating releases through valve control rather than spill water. Thus, one benefit of the New Slab Creek Powerhouse Project is that it would significantly advance the date of SMUD’s ability to control the precise release of boating flows from Year 15 to Year 4 of the new license.

2.2 Need for Power in SMUD’s Service Area

SMUD generates, transmits, and distributes electric power to a 900-square-mile service area that includes Sacramento County and small portions of Placer and Yolo counties. General information concerning SMUD and its customer-owners as of January 2011 includes:

New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)
SMUD has augmented the UARP with other generation assets to create an environmentally-preferred energy portfolio that includes hydro, natural gas-fired generation (thermal), solar, and wind resources. The lynchpin of SMUD’s energy portfolio, however, is the UARP. No other energy source provides comparable reliability, flexibility, and economic benefits. Without the UARP, SMUD could not provide the current level of service our customer-owners require.

2.3 Greenhouse Gas Reduction and Renewable Portfolio Standards

SMUD is nationally recognized as a leader in generating electricity from renewable resources, in developing energy efficiency programs, and in pioneering electric transportation alternatives. Reducing global warming is a key element of SMUD’s vision for the future.

The SMUD Board of Directors adopted a sustainable power supply goal of reducing long-term greenhouse gas emissions to 10 percent of 1990 carbon dioxide emission levels by 2050 (i.e., less than 350,000 metric tons/year) while assuring reliability of the system; minimizing environmental impacts on land, habitat, water quality, and air quality; and maintaining a competitive position relative to other California electricity providers. In addition, SMUD’s RPS features the aggressive goal of supplying 20 percent of its energy from renewable sources by 2010 and 33 percent by 2020. These goals are consistent with California’s recently enacted Renewable Energy Resources Act of 2011.

The Project will produce an average of approximately 10,500 megawatt-hours (MWh) of renewable power annually. Using the Oak Ridge Competitive Electricity Dispatch computer model, the regional carbon intensity factor for a gas-fired facility in California would be approximately 155 kilograms (kg) of carbon per MWh produced. This means the proposed Project will benefit the Sacramento region and foothill communities in Placer and El Dorado counties by annually displacing approximately 1,794 metric tons of carbon emissions (10,500 MWh/yr \times 155 \text{ kg of carbon/MWh} \times 0.001102 \text{ metric tons/kg}). Thus, the Project will simultaneously contribute to SMUD’s greenhouse gas reduction and RPS goals.
EXHIBIT A

3.0 DESCRIPTION OF THE PROPOSED NEW SLAB CREEK POWERHOUSE

This section describes the facilities that will constitute the Project and provides an overview of the existing UARP water conveyances that will be utilized for the new powerhouse. The UARP consists of a series of reservoirs, tunnels, and powerhouses in the Rubicon River, Silver Creek, and SFAR watersheds. The UARP comprises seven developments and the components necessary to utilize the available water resources for hydroelectric generation. These developments are:

- Loon Lake
- Robbs Peak
- Jones Fork
- Union Valley
- Jaybird
- Camino
- Slab Creek/White Rock

A geographical illustration and map of the Project area are shown in Figures 3.0-1 and 3.0-2, respectively. The Project represents a modification of the Slab Creek/White Rock Development, essentially combining the existing Slab Creek Powerhouse with the new larger powerhouse to generate more power with water released to meet the new, higher minimum flows as well as facilitate boating flow releases required by the new license. To address operational challenges and safety issues, the Project will be powered by water released from the existing White Rock Tunnel via the tunnel adit, ¼-mile downstream of Slab Creek Dam.

Selected photographs of existing UARP facilities and natural resources in the Project are referenced throughout the remainder of this document and included in Appendix A.
Figure 3.0-1: Geographical illustration of the proposed New Slab Creek Powerhouse Project.
Figure 3.0-2: GIS map of proposed New Slab Creek Powerhouse Project.
3.1 Description of the Proposed Project and Alternatives

The SMUD proposed Project is described in Sections 3.1.1 and 3.1.2. Section 3.1.1 describes the existing facilities of the UARP Slab Creek/White Rock Development that are pertinent to the proposed Project. Section 3.1.2 describes proposed modifications to these existing facilities and new features that constitute the New Slab Creek Powerhouse Project. Section 3.1.3 contains a discussion of alternatives considered but not selected by SMUD.

3.1.1 Existing Slab Creek/White Rock Development Facilities

The Slab Creek/White Rock Development is located in El Dorado County, California, approximately 50 miles east of Sacramento. In brief, it consists of Slab Creek Dam and Reservoir, Slab Creek Powerhouse located at the base of the dam, White Rock Tunnel and Penstock, and White Rock Powerhouse, the largest (224 MW) and most downstream UARP facility. The development utilizes water released from the UARP Camino Powerhouse, combined with inflow of the SFAR. White Rock Powerhouse discharges into Chili Bar Reservoir, a component of the Pacific Gas & Electric Company (PG&E) Chili Bar Hydroelectric Project. Slab Creek Dam and Powerhouse are located on public land within the USFS El Dorado National Forest (ENF). Most of the remaining development facilities are located on private land adjacent to and beyond the western boundary of the ENF. Adit #2 and a small portion of the transmission line lie on Bureau of Land Management land within the Project boundary.

**Slab Creek Dam** — A double curvature, variable radius, concrete arch dam spanning the SFAR, 817 feet long and 250 feet high, with a central uncontrolled overflow spillway. The dam creates Slab Creek Reservoir which has a capacity of 16,600 ac-ft and an area of 280 acres at normal maximum water surface elevation of 1,850 feet (Appendix A, Photo 1).

**White Rock Intake and Gate House** — A submerged, reinforced concrete intake structure located in Slab Creek Reservoir near the south bank abutment of Slab Creek Dam. The intake is protected by a trash rack. A separate, above-ground, gate house contains a bulkhead gate and fixed wheel gate to control water entering the White Rock Tunnel from the reservoir.

**White Rock Tunnel and Adits** — A 20- to 24-foot diameter modified horseshoe tunnel 4.9-miles-long connecting the White Rock Intake in Slab Creek Reservoir to the White Rock Penstock. The entire tunnel is pressurized, with a surge shaft, and includes lined and unlined portions. The flow capacity is 4,009 cfs with maximum tunnel velocity of 8.2 fps in the unlined portions and 10.1 fps in the lined portions. Three adits exist along the White Rock Tunnel length: Adit #1, located approximately 2.2 miles downstream from the White Rock Intake; Adit #2, approximately 4.3 miles downstream from the intake; and Adit #3, approximately 0.25 mile downstream from the intake (Appendix A, Photo 2).
White Rock Penstock — A 9- to 15-foot-diameter, 0.3-mile-long above-ground steel penstock connecting White Rock Tunnel to White Rock Powerhouse. Maximum flow capacity is 4,009 cfs with a maximum velocity of 28.0 fps.

White Rock Powerhouse — An indoor, reinforced concrete structure located on the south bank of the SFAR. The powerhouse has a structural steel frame supporting the roof and overhead crane. The powerhouse is equipped with two turbines, one rated at 112,976 kW and the other at 115,485 kW at best gate opening, and two generators, each rated at 109,250 kW. The White Rock Powerhouse turbines are vertical shaft Francis-type units with synchronous bypass valves to limit penstock pressures. Each turbine has an automatic grease injection system for lubrication. The units also have air injection systems to limit turbine vibration and noise. Normal unit operation is near full load during peak periods of the day, if water is available. The units are commonly shut down in off-peak periods. These units will have to limit water throughput during recreational releases at the Project.

White Rock Powerhouse Transmission Lines — Two 230 kV overhead transmission circuits emanating from the White Rock Powerhouse. One taps the existing circuit from Camino and the other taps the existing circuit from Jaybird. The lines from the powerhouse run a distance of 21.8 miles to Folsom Junction, where they enter SMUD’s integrated transmission grid.

Slab Creek Dam Penstock and Valve — A 40-foot-long, 36-inch-diameter, steel penstock that passes through Slab Creek Dam and connects to a 24-inch ring jet valve. The penstock is encased in the concrete of Slab Creek Dam. The valve, with centerline of 1,680-feet elevation, is capable of releasing up to approximately 270 cfs at reservoir full pool, and was designed for emergency evacuation of reservoir water. The penstock bifurcates on the downstream edge of the dam into a short penstock leading to the existing Slab Creek Powerhouse.

Slab Creek Powerhouse — A reinforced concrete structure built onto the downstream face of Slab Creek Dam. The single vertical-axis Francis turbine within the powerhouse has a FERC nameplate capacity at best gate opening of 450kW and is attached to a generator rated at 485 kW. A 24-inch ring jet valve attached to the penstock has a maximum capacity at normal pool of approximately 270 cfs. The turbine was installed to generate power from the minimum stream release flows of 36 cfs ordered by FERC in 1981, and was placed in service in 1983. The turbine is typically operated at a uniform base-load setting slightly above the minimum flow requirement. The nameplate rated flow is 36 cfs. Discharge from the turbine exits through the tailrace below the powerhouse floor, falling through air to the spillway plunge pool downstream of the dam. The powerhouse has been vulnerable to damage and flooding from large spill events.

Slab Creek Powerhouse Transmission Line — Electric transmission infrastructure associated with the existing Slab Creek Powerhouse including: (1) a 600-foot, 480 V
circuit traverses upwardly across the dam face to (2) a 480V/12kV transformer into White Rock Tunnel gate house, and finally into (3) a switchyard located on the top of the White Rock Tunnel Gate House connecting the powerhouse transmission line to a 12-kV distribution line owned and operated by PG&E.

**Minimum Release Compliance Measurement** — A USGS gauge 11443500, located in the existing Slab Creek Powerhouse. The gauge is an acoustic-velocity meter.

### 3.1.2 Proposed New Facilities and Existing Facility Modifications

The proposed Project includes the construction of a new powerhouse at a site located directly adjacent to the portal to the existing Adit #3 of the White Rock Tunnel. The new powerhouse will be located on the south bank of the SFAR, approximately ¼-mile downstream of the Slab Creek Dam, on SMUD-owned land. This new location is based largely on local morphology and existing water conveyance infrastructure. The dam lies in a narrow portion of the SFAR canyon, but directly downstream the river canyon widens on the south flank in association with the inflow of Iowa Canyon Creek. This juxtaposition of a narrow canyon and open riverbed was ideal for constructing the dam in the 1960s. The wide segment offered access to the riverbed from which the dam was easily constructed in the constricted river segment (Appendix A, Photo 2). This same geographic feature renders the adit site as an ideal location to construct the new powerhouse.

In locating the new powerhouse at this site, and in conjunction with the existing Slab Creek Dam Powerhouse, SMUD considered the dual objectives of releasing the minimum and boating flows required by the new license. While the option exists to physically separate minimum and boating releases, the best approach from several perspectives is to combine the two water release functions into a single new powerhouse/boating release valve complex at the adit. This does not necessarily mean all Slab Creek release requirements will emanate from the adit complex; both facilities (dam and adit complex) will contribute to minimum and boating releases. Thus, under the proposed Project, a portion of the Slab Creek minimum and boating flow requirements will be made at the dam, with the balance emanating from the proposed adit complex. A single penstock from the White Rock Tunnel to the new powerhouse will deliver water through the adit for the balance of minimum and boating releases. This requires less construction, increases efficiency, is more economical and improves flow release precision and boater safety compared to the construction of similar dual-purpose facilities at the adit and base of the dam, as explained in greater detail in Section 3.1.4.

**White Rock Tunnel Adit #3** — The existing adit is a 24-foot-diameter, 400-foot-long, horseshoe tunnel between the White Rock Tunnel and the south bank of the SFAR, approximately ¼-mile downstream of Slab Creek Dam. The adit portal is directly adjacent to the riverbank (Appendix A, Photo 2). From the White Rock Tunnel bulkhead, the first 50 feet of the adit is concrete-lined while the remaining length is...
shotcrete-lined. The Project’s penstock will be constructed inside the adit. The bulkhead to the White Rock Tunnel will be modified to accommodate the connection of the penstock.

**New Slab Creek Penstock** — A new, approximately 400-foot-long, 8-foot-diameter steel penstock will be located within Tunnel Adit #3, connecting the Project with the White Rock Tunnel. The penstock will be fully encased in concrete within the concrete-lined segment of the adit and supported on concrete saddles within the unlined segment. The penstock will bifurcate just outside the adit portal, with one leg going to the powerhouse and another leading to the fixed-cone valve used for boating releases.

**New Slab Creek Powerhouse** — The Project will be located on the south (left) bank of the SFAR, directly adjacent to the portal of Tunnel Adit #3, approximately ¼-mile downstream from the existing Slab Creek Powerhouse (Appendix A, Photos 2 and 4). The new powerhouse will be located on SMUD-owned property. Because of its location along the river margin, the powerhouse will be a reinforced concrete structure, founded on bedrock and capable of withstanding the high tailwater elevation associated with the 100-year flood frequency event. The structure will have a footprint approximately 80 feet long by 30 feet wide (Figure 3.1.2-1). The powerhouse will house a single turbine-generator, with a capacity to pass up to 156 cfs of flow. The Francis turbine and direct-coupled synchronous generator, rated at 2,500 kW, will result in a 2.7-MW powerhouse, capable of producing an average annual generation of approximately 10.5 GWh.

**Boating Release Valve and Vault** — The valve vault will be a reinforced concrete structure constructed directly downstream of the new powerhouse, near the edge of the SFAR. The vault will contain an isolation butterfly valve and a fixed cone valve with hood and energy dissipating baffles. The outlet works of the valve vault will be designed and oriented in a downstream direction along the left bank of SFAR. Water released from the valve will enter an energy dissipating structure designed to further minimize deleterious effects of water spray on whitewater boaters navigating rapids adjacent to the facility.

**New Slab Creek Powerhouse Circuit Power-line** — Electricity generated at the new powerhouse will connect to the 12kV line associated with the existing Slab Creek Powerhouse. SMUD will construct a 10-pole, 2,000-foot 12 kV powerline extension, which connects on top of the White Rock Tunnel Gate House to a 12 kV distribution power line owned and operated by PG&E (see Figure 3.3.11-1 below).

**New Minimum Release, Boating Release and Ramping Rate Compliance Measurement** — The compliance measurement point for minimum, boating, and ramping rate releases from Slab Creek Reservoir to the SFAR will move to the new powerhouse ¼-mile downstream from the existing compliance gauge, USGS gauge 11443500, located in the existing Slab Creek Powerhouse. Flow released by the new
Figure 3.1.2-1: Enlarged Site Plan of proposed New Slab Creek Powerhouse Project (FNLAA F1)
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powerhouse will be gauged in the main penstock, prior to its bifurcation into the powerhouse and fixed cone valve penstocks. The main penstock will be equipped with a 4-path acoustic type flowmeter. The flowmeter will use transducers properly located in the penstock or inlet pipe and will be removable for cleaning/maintenance while the penstock is full and pressurized. Minimum and boating release compliance will be the sum of discharge measurements at the USGS gauge and penstock. The rating curve from the existing river gauging station on the SFAR within the ¼-mile reach will be used to convert changes in penstock flow to changes in river stage, thereby demonstrating compliance with the ramping rate requirement of the new license. Inflow from Iowa Canyon Creek, which enters the SFAR between the existing USGS gauge and proposed location of the new penstock, will not be measured and therefore not included in the summed values of the compliance record.

**Slab Creek Dam Reach Boating Put-in Facilities** — Whitewater boating put-in facilities are included in this project description to ensure that construction of the New Slab Creek Powerhouse does not interfere with the ability of boaters to launch rafts and kayaks in the SFAR during boating release events. The facilities proposed for launching whitewater boats include a parking area along Slab Creek Road and a put-in on the south bank of the SFAR with a drop-off and turnaround area at the base of the old construction road (Atkins et al. 2011). The parking area lies approximately 270 feet from the terminus of Slab Creek Road. The site, a previous borrow site that sits on USFS land, is the only area in the vicinity that can be reasonably widened to provide approximately 20 diagonal parking spaces (Appendix A, Photo 5). To maximize parking capacity and minimize on-site congestion and user conflicts, the surface will be paved and the parking spaces striped. The proposed boater put-in is located at a cobble bar about 1,470 feet downstream from the terminus of Slab Creek Road. The old construction road will be improved to the extent necessary to provide passage and turnaround capabilities for powerhouse construction vehicles, which will facilitate whitewater boating traffic. The cobble bar is located at the downstream end of a large pool under a footbridge across the SFAR (Appendix A, Photo 6). The put-in also lies at the upstream end of a 200-foot-long, low-gradient rapid that extends downstream to the confluence with Iowa Canyon Creek (See Figure 3.0-2). The existing old construction road leading to the cobble bar will be graded and large rocks leading to the bar will be removed.

3.1.3 Proposed Environmental Measures

The Proposed New Slab Creek Powerhouse includes a number of environmental measures, each of which is summarized below. An evaluation of each measure is provided in Exhibit E (Section 4) of this FNLAAP.

1. Slab Creek Dam Minimum Release Schedule

Beginning as early as reasonably practical within three months after the conclusion of construction activities, SMUD will maintain minimum streamflow releases from Slab Creek Dam as described in Table 3.1.3-1. The purpose of these releases is to protect
aquatic resources in the ¼-mile segment of the South Fork American River between the dam and the location of the new powerhouse. The compliance gauge for the Slab Creek Dam releases will be USGS Gauge 11443500, located at the existing Slab Creek Dam Powerhouse. The full suite of Slab Creek Reservoir releases required in the new UARP license, including minimum (63-415 cfs), boating (850-1,500 cfs), and ramping rates (1 foot/hr river stage change) will be gauged for compliance purposes at the new powerhouse site (see Exhibit B, Section 3.2).

| Table 3.1.3-1. Proposed Minimum Streamflow Releases (cfs) from Slab Creek Dam, by water year type¹. |
|----------------------------------|----------------|----------------|----------------|----------------|
| Month                           | Critical Dry  | Dry            | Below Normal   | Above Normal   |
| October                         | 15            | 15             | 20             | 20             |
| November                        | 15            | 15             | 15             | 15             |
| December                        | 15            | 15             | 15             | 15             |
| January                         | 15            | 15             | 15             | 15             |
| February                        | 15            | 15             | 15             | 15             |
| March                           | 15            | 20             | 20             | 30             |
| April                           | 15            | 20             | 20             | 36             |
| May                             | 15            | 20             | 36             | 36             |
| June                            | 15            | 20             | 30             | 30             |
| July                            | 15            | 20             | 20             | 20             |
| August                          | 15            | 20             | 20             | 20             |
| September                       | 15            | 20             | 20             | 20             |

Water year type definitions are contained in the new UARP license.

2. Storm Water Pollution Prevention Plan (and Spill Prevention and Control)

No later than 90 days before initiating ground-disturbing activities, SMUD will file with FERC for approval a Storm Water Pollution Prevention Plan (SWPPP). Prior to the FERC filing, SMUD will consult with appropriate resource agencies, develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The plan is intended to minimize the introduction of hazardous materials to storm water runoff accumulating in and/or passing over the construction zone. The plan will include measures SMUD will implement to protect water quality and manage hazardous substances during construction of the New Slab Creek Powerhouse Project. This plan will include a component that focuses on spill prevention and control. The plan will be prepared by a Qualified SWPPP Developer (QSD), in consultation with CDFW, USFS, and SWRCB. The plan will be implemented by a Qualified SWPPP Practitioner (QSP), who will also evaluate the adequacy and effectiveness of the erosion control measures throughout Project construction activities. Once construction is complete and the SWPPP is no longer applicable, SMUD will add the operation of the New Slab Creek Powerhouse and Boating Flow Valve to the SMUD-wide Spill Prevention and Control Plan. This plan will focus on averting impacts to water quality associated with project operation.
3. Erosion and Sedimentation Control Plan

No later than 90 days before initiating ground-disturbing activities, SMUD will file with FERC for approval an Erosion and Sedimentation Control Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies, develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The plan is intended to minimize soil erosion in the Project construction zone and the transport of sediment into storm water discharges away from the construction zone. The plan will describe measures SMUD will implement to protect water quality and control erosion during construction of the New Slab Creek Powerhouse Project. It will be prepared by the same QSD and implemented by the same QSP involved in the Storm Water Pollution Prevention Plan.

4. Iowa Canyon Creek Reconfiguration Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC for approval an Iowa Canyon Creek Reconfiguration Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies (see below), develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan is to return lower Iowa Canyon Creek (roughly the lowermost 200 feet) to a more natural grade and streambed width to allow surface flow and biological connectivity to the SFAR during summer/fall low flow. The plan filed with FERC will be developed in consultation with USFS, USACE, CDFW, USFWS, and SWRCB. The plan will also be incorporated in the SWRCB 401 Water Quality Certification, USACE 404 Dredge and Fill Permit, and CDFW 1602 Streambed Alteration Agreement. SMUD will also include a monitoring program for surface water, benthic macroinvertebrate colonization, and riparian vegetation to ensure the objectives of the plan (primarily surface flow for trout movement) are realized.

5. SFAR Habitat Improvement Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC for approval a SFAR Habitat Improvement Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies (see below), develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan will be to ensure that minimum streamflow releases emanating from Slab Creek Dam (see Table 3.1.3-1) will pass through a 550-foot segment of the SFAR as surface flow rather than subsurface flow, thereby providing riffle habitat for aquatic resources. Accordingly, the plan will include a procedure to move large boulders, concrete debris, and construction waste rock from the main channel to a point on top of an existing high lateral bar adjacent to it. SMUD will develop the SFAR Habitat Improvement Plan in consultation with the USACE, USFS, CDFW, USFWS, and SWRCB. The plan will also include a post-construction surface flow and water temperature monitoring sub-plan that will determine the effectiveness of the habitat improvement plan. The plan will also be incorporated in the New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)
SWRCB 401 Water Quality Certification, USACE 404 Dredge and Fill Permit, and CDFW 1602 Streambed Alteration Agreement.

6. SFAR Gravel Augmentation Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC for approval a SFAR Gravel Augmentation Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies (see below), develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan will be for SMUD to enhance trout spawning habitat in the ¼-mile reach. The plan will focus on increasing the amount of spawning gravel in the 600-foot segment between the large pool and new powerhouse. The plan will involve piling gravel along the SFAR bank near the proposed whitewater boating put-in where it will be entrained during periods of high spill flow at Slab Creek Dam and dispersed by fluvial transport to downstream depositional areas such as the lee of large boulders. SMUD may use source gravel derived from the Iowa Canyon Creek Reconfiguration Plan, if sufficient quantities are available. The size of the gravel pile is expected to be 200-300 cubic yards; its replenishment frequency will be determined by the results of annual monitoring of the pile size and gravel distribution in the 600-foot section of the SFAR. SMUD will develop the SFAR Gravel Augmentation Plan in consultation with the USACE, USFS, CDFW, USFWS, and SWRCB for the rock removal. The plan will be incorporated into the SWRCB 401 Water Quality Certification, USACE 404 Dredge and Fill Permit, and CDFW 1602 Streambed Alteration Agreement. SMUD will also include water quality (in-situ and chemistry), benthic macroinvertebrate (BMI), algae, and fish population monitoring sites within the ¼-mile reach, thereby augmenting the monitoring sites already established for the same resources throughout the UARP.

7. Special-Status Plant Protection Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC for approval, a Special-Status Plant Protection Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies (see below), develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan will be to minimize the probability of Project construction and/or operational impacts on *Clarkia biloba* ssp. *Brandegeae*. The plan will include a number of measures, including species protection during construction, employee training, development of an appropriate GIS database, and inclusion of special-status plants at the Project site into the UARP Vegetation Management Plan. SMUD will develop the plan in consultation with the USFS, CDFW, and USFWS. SMUD will also include a riparian vegetation monitoring site within the ¼-mile reach in addition to the riparian monitoring sites throughout the UARP.
8. Invasive and Noxious Weeds Management Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC for approval, an Invasive and Noxious Weeds Management Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies, develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan will be to minimize the establishment and spread of invasive and noxious plants within the Project area. The plan will include a number of measures, including employee education, development of an appropriate GIS database, re-vegetation of construction sites, cleaning of equipment, and inclusion of invasive and noxious plants at the Project site into the UARP Vegetation Management Plan. SMUD will develop the plan in consultation with the USFS, CDFW, and USFWS.

9. Pre-construction Bat Survey

Within one year of initiating construction activities, SMUD will file with FERC for approval a Pre-Construction Bat Survey Plan. Prior to the FERC filing, SMUD will consult with appropriate resource agencies, develop a draft plan, submit the draft plan to the resource agencies for 90 days of review and comment, and modify the plan accordingly. The purpose of the plan will be to ensure protection of bat species roosting near the Project area. The survey will estimate the amount and type of suitable roosting habitat, determine the presence/absence of bat species, and presence of existing day, night, or maternity roosts in the Project area. If the surveys indicate the presence of special-status bats, appropriate avoidance, protection, and/or mitigation measures will be developed prior to the initiation of construction. SMUD will develop the plan in consultation with the USFS, CDFW, and USFWS.

10. Raptor Electrocution Protection

During the final design phase of the Project, SMUD will develop powerline pole designs that will protect raptors and other bird species from potential electrocution. The pole designs will comply with current standards for power poles using Avian Protection Plan guidelines (APLIC and USFWS 2005). The pole designs will be developed in consultation with the USFS, CDFW, and USFWS.

11. Whitewater Boating Protection

During the final design phase of the Project, SMUD will develop a design for the boating release valve that will minimize spray interfering with whitewater boaters negotiating rapids as they pass the valve. The design will include an energy-dissipating structure associated with the boating release valve. The design will be developed in consultation with representatives of the boating community, including American Whitewater, American River Recreation Association, California Outdoors, and other interested private boaters.
12. New Slab Powerhouse Construction Transportation Management Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC a New Slab Powerhouse Construction Transportation Management Plan. The purpose of the plan will be to minimize the effects of construction traffic on the transportation system of the Project area. The plan will contain a number of measures, including: (1) use of an offsite staging area for workers and delivery trucks; (2) scheduling construction traffic from the staging area to avoid periods of peak traffic, Apple Hill tourism traffic, and school bus pick-up/drop-off timing; (3) compliance with applicable laws, ordinances, regulations, and standards; (4) road improvements and reconstruction if damaged; and (5) implementation of driver awareness training.

13. New Slab Powerhouse Construction Fire Protection Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC a New Slab Powerhouse Construction Fire Protection Plan. The purpose of the plan will be to minimize the threat of construction activities igniting a fire. The plan will adhere to all Federal, State, and Local regulations regarding fire protection-related issues such as fuels management, smoking, and use of flammable materials. To ensure consistency with these regulations, SMUD will submit the construction plan for review and approval by State, Federal, and Local fire agencies. During the construction period, SMUD will also implement a number of measures to reduce fire risk. These will include: (1) measures to implement when operating mechanical equipment on the construction site and while driving to and from the work sites; (2) measures for the storage and handling of explosive and/or flammable materials; (3) procedures for construction site firefighting; (4) fire safety awareness training as part of the employee environmental awareness program; (5) emergency procedures including notification and evacuation procedures and routes; (6) prohibition against smoking outside of designated areas; and (7) implementation of an on-site water supply system to stop fires from spreading.

14. New Slab Powerhouse Construction Noise Plan

No later than 90 days before initiating construction activities, SMUD will file with FERC a New Slab Powerhouse Construction Noise Plan. The purpose of the plan will be to minimize the level of noise emanating from the construction site and local roads. The plan will include a number of measures including: (1) limiting the hours and days of noise-generating construction activities; (2) periodic monitoring of noise generated by construction activities; (3) proper maintenance of construction equipment to reduce noise; (4) establishing a community response program; (5) requiring all vehicles to undergo regular maintenance, in particular muffler maintenance; (6) limit speeds on Slab Creek Road to 20 mph or less; (7) limiting equipment/materials transportation to within 9:00 a.m. and 2:00 p.m. on weekdays; and (8) limiting idling for vehicles.
3.1.4 Alternatives to Proposed Project

Meeting the new UARP license requirements for minimum releases and boating flows can occur in a variety of ways. SMUD carefully evaluated the opportunities and constraints of three alternative Project configurations including: (1) no Slab Creek Powerhouse; (2) building the powerhouse and boating release valve at the base of Slab Creek Dam; and (3) locating a new powerhouse at the dam and a boating release valve at the adit. The opportunities and constraints analysis included an assessment of construction costs. The constraints analyzed included cost, engineering feasibility, construction efficiency, boater safety, and boating flow release precision. The engineer’s opinion of probable construction cost (OPCC) for the proposed New Slab Creek Powerhouse Project is $12.5M (See Exhibit D).

Alternative 1: No Slab Creek Powerhouse

Under the No Slab Creek Powerhouse alternative SMUD would: (1) replace the existing 24-inch ring jet valve at the downstream end of the 36-inch penstock embedded in Slab Creek Dam with a 36-inch ring jet valve by Year 3 to comply with the new minimum releases; and (2) spill boating flows over Slab Creek Dam until at least Year 15 of the new license.

A feature of this alternative is the probable termination of power generation at Slab Creek Dam. The primary reason for terminating power at the Slab Creek Dam powerhouse is the force of minimum flows passing through the new 36-inch power penstock will diminish water flow from entering the arm off the penstock leading to the powerhouse.

A secondary reason for terminating operation of the powerhouse relates to maintenance issues. The location of the existing Slab Creek Powerhouse against the base of the dam leads to ongoing problems with damage and maintenance. While maintenance at the existing powerhouse is challenging due to general access limitations (human access via a stairway on the dam face; equipment access via a cable system), the most significant maintenance problem is powerhouse damage during spill events. Water passing directly over the ogee crest spillway falls into a large plunge pool at the base of the dam. Although Slab Creek Dam is a double arch dam where the lip of the spillway actually extends beyond, or downstream of, the base of the dam, a portion of the spilling water nevertheless curls back towards the base of the dam and strikes the existing Slab Creek Dam powerhouse. At a minimum, spill events at Slab Creek Dam result in chronic maintenance and repair to equipment wetted by spill water, such as electrical conduits. High volumes of spilled water can also damage the powerhouse, especially when logs and other floating debris are combined with high energy flows.

Spills at Slab Creek Dam are fairly frequent. Unlike the UARP storage reservoirs, as a regulating reservoir, Slab Creek Reservoir was not designed for, nor is it capable of, capturing large runoff events from the mostly unregulated SFAR basin. During the flood of 1997 for example, when flows in excess of 62,000 cfs spilled at Slab Creek Dam,
falling water laden with woody debris damaged the powerhouse to such an extent it was out of service for five years. In water year 2011, a recent wet water year, the powerhouse was shut down due to water damage from March 16 through July 27. Water-caused structural damage during spill events such as these carries with it the risk of accidental release of petroleum products, such as lubricants, oil, and grease.

This alternative, with an engineer’s OPCC of $2.1M, was rejected primarily because it would eliminate the ability to generate renewable energy with the new minimum releases from Slab Creek Reservoir and would not address safety concerns of spilling water to create boating flows (see discussion in Section 3.2.1). Serious concerns were also raised about the negative effects of regularly passing large volumes of water (up to 415 cfs) through the 36-inch penstock, with water velocities as high as 50-60 fps. These concerns focused on issues of: (1) integrity of the concrete of the bellmouth intake on the upstream side of the dam, (2) fish entrainment, (3) potential trash rack failure or valve failure, and (3) increased sediment transport causing atypical, accelerated wear in the outlet pipes, the turbine shutoff valve, the turbine and the fixed cone valve. Test releases of the existing 24-inch valve were conducted in February of 2013, confirming the magnitude of water velocities at releases of 250-270 cfs.

Alternative 2: New Powerhouse and Boating Release Valve at Slab Creek Dam

Under this alternative, SMUD would construct a new Slab Creek Powerhouse at the base of Slab Creek Dam, essentially in the same location as the existing powerhouse. A new valve would also be installed to release boating flows from the dam. To minimize construction costs and spill water damage to the new facilities, the new turbine, with a 1.3-MW capacity, would be designed to fit within the confines of the existing powerhouse walls. Release of boating flows at the dam would be accomplished by installing a new 120-inch-diameter pipeline that penetrates Slab Creek Dam and is fitted with a ring jet valve. Appurtenant facilities would consist of an upstream slide gate, an upstream gate bypass pipeline and valve (for filling the main pipeline), and a trash rack. Because such a pipeline penetration must proceed with a full reservoir (draining Slab Creek Reservoir is not an option because of aquatic resource and power generation impacts), it would also be necessary to build an upstream enclosure around the location of the upstream slide gate.

Construction access to the base of Slab Creek Dam poses significant construction challenges and high costs. The base of the dam is not accessible by vehicle; the only means of accessing the existing powerhouse is via a staircase attached to the dam face. The size of the new turbine and other powerhouse facilities coupled with the depth and steepness of the SFAR canyon walls would require the use of complicated cranes that span over the SFAR canyon from the narrow road system on the canyon wall 200 feet above the riverbed. The only other option is to stage construction from the SFAR riverbed itself. This option would require a dewatering of the river channel approximately ¼-mile downstream of the dam and construction of a heavy equipment
road up the river channel to facilitate access to the dam face. The costs, logistics, and environmental impacts of this option do not favor its selection.

The new powerhouse at the base of the dam would be vulnerable to the same spill water damage as the existing powerhouse. Additionally, this alternative would require continued use of the current access stairs and cable system for maintenance. As it is now, the powerhouse is not accessible by vehicle and if any major repair is needed, a powerhouse of twice the current one’s size could only be accessed from downstream, in the riverbed.

Locating a new powerhouse at the base of the dam and including a new release valve for boating flows was rejected for a variety of reasons, including construction cost, maintenance, and operational considerations. The engineer’s OPCC for a new small turbine (1.3 MW) that fits within the confines of the existing powerhouse is $13M, while the engineer’s OPCC for a boating release jet valve is $10M. The combined cost of $23M renders this alternative uneconomic in that power generation revenues would be insufficient to offset costs. Installing a 2.7 MW powerhouse at the base of Slab Creek Dam, while generating a greater amount of renewable energy than the 1.3 MW plant, would be more costly than $13M, therefore even less feasible economically.

Alternative 3: Powerhouse at Slab Creek Dam and Boating Release Valve at the Adit

This alternative is similar to Alternative 2 except it avoids the need to install a new pipeline through Slab Creek Dam to provide boating flow releases. Accordingly, a new 1.3-MW powerhouse would be constructed at the base of the dam while the penstock, jet valve, and valve house (with energy dissipating structure) included in the proposed Project would be constructed at the adit site. Minimum flows would be released at the dam and boating flows released at the adit.

While this alternative would eliminate the engineering challenges of penetrating Slab Creek Dam with a new pipeline, it offers little improvement over Alternative 2. The same construction and maintenance constraints discussed in Alternative 2 would apply to this alternative. Serious concerns of releasing high volume flows at velocities approaching 50-60 fps are present with this alternative, as discussed under Alternative 1. It would include similar environmental benefits to Alternative 2, but would result in lost power generation potential by not using the adit release to generate power. This alternative would create two separate construction projects estimated to cost $17M, rendering it an uneconomic alternative from a power generation perspective.
EXHIBIT B

3.2 Project Operations

3.2.1 Existing Slab Creek/White Rock Development Operations

The new UARP license requires that SMUD operate Slab Creek Reservoir to provide minimum flows, boating flows, and ramping rates. In the case of minimum flow release requirements, SMUD must eventually release flows into the SFAR ranging from 63 to 415 cfs. In recognition of the limitation of existing Slab Creek Dam release facilities, the new license allows SMUD to release minimum flows up to 263 cfs for the first three years of the license. By Year 4, SMUD must have facility improvements in place to implement minimum release requirements up to 415 cfs.

To provide required boating flows ranging between 850 to 1,500 cfs beginning in Year 1 of the new license, the facility limitations give SMUD no other option than to spill water over the Slab Creek Dam spillway. The use of spilled water (Appendix A, Photo 7) to provide boating flows will continue through Year 10, at which time SMUD must determine, in consultation with the UARP Relicensing Consultation Group, if facility modifications are necessary to release boating flows. If modifications are deemed necessary, SMUD must implement the boating flows using the modified facilities by Year 15. However, operating Slab Creek Reservoir in spring months to spill boating flows over the dam creates a safety issue associated with the powerhouse emergency shutdown. All UARP powerhouses are equipped with safety systems that automatically shut down the powerhouse when an equipment malfunction is detected. Thus, if White Rock Powerhouse were to shut down automatically during a boating flow spill event, the volume of water passing through the White Rock Tunnel would immediately cease moving, and thus be added to spilled water, potentially adding up to 3,900 cfs to the discharge in the SFAR. Flows in excess of 2,000 cfs have been determined to present a safety issue for whitewater boating in this reach (DTA and LBG, 2004).

To comply with the new license, SMUD is required to achieve river stage ramping rates no faster than one foot per hour when implementing boating flows below Slab Creek Dam. This requirement will be difficult to meet when spilling water over the dam in spring months. The combination of high hourly variability in spring snowmelt runoff, a 16,600 acre-feet reservoir volume, and a 450-feet-wide spillway will likely result in a high degree of imprecision in ramping spill flows up and down.

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1 Pursuant to the USFS Final Terms and Conditions, Year 1 is the first year during which all initial minimum streamflows required by the license are implemented by May 1.
2 The UARP Relicensing Settlement Agreement identifies the Consultation Group as all parties to the 2007 Settlement Agreement, which generically includes SMUD, Pacific Gas and Electric Company, State and Federal resource agencies, non-governmental organizations, and individuals.
3 The timing of decision points and construction completion dates is based on the assumption that SMUD does not commence construction of the Iowa Hill Pumped-storage Development prior to Year 10 or complete construction by Year 15.
3.2.2 Proposed Project Operations

Construction of the Project will enable SMUD to more precisely operate its facilities in compliance with all aspects of the new UARP license including minimum and whitewater boating releases, as well as ramping rates. With the new powerhouse/boating valve complex, water will be released from four locations to achieve the variable release requirements, which range from 63 to 1,500 cfs. The four locations include: (1) the existing 24-inch ring jet valve at the base of Slab Creek Dam; (2) the existing Slab Creek Dam Powerhouse; (3) the turbine of the New Slab Creek Powerhouse; and (4) the boating release valve adjacent to the new powerhouse.

Minimum releases will primarily be made from the existing and new powerhouses. Under the proposed operation, at no time will minimum release from the existing powerhouse at the base of the dam fall below the values shown in Table 3.2.2-1. The purpose of these releases is to protect aquatic resources in the ¼-mile segment of the South Fork American River between the dam and the location of the new powerhouse.

| Table 3.2.2-1. Proposed Minimum Streamflow Releases (cfs) from Slab Creek Dam, by water year type¹. |
|---|---|---|---|---|
| Month | Critical Dry | Dry | Below Normal | Above Normal | Wet |
| October | 15 | 15 | 20 | 20 | 20 |
| November | 15 | 15 | 15 | 15 | 15 |
| December | 15 | 15 | 15 | 15 | 15 |
| January | 15 | 15 | 15 | 15 | 15 |
| February | 15 | 15 | 15 | 15 | 15 |
| March | 15 | 20 | 20 | 20 | 30 |
| April | 15 | 20 | 36 | 36 | 36 |
| May | 15 | 20 | 36 | 36 | 36 |
| June | 15 | 20 | 30 | 30 | 30 |
| July | 15 | 20 | 20 | 20 | 20 |
| August | 15 | 20 | 20 | 20 | 20 |
| September | 15 | 20 | 20 | 20 | 20 |

¹Water year type definitions are contained in the new UARP license.

Releases from these two points, when summed, will generally satisfy the overall release requirements of the new license. However, because the new powerhouse has a maximum hydraulic capacity of 156 cfs, there will be months of certain years when the sum of the two releases does not achieve the requirement. In most spring months, the combined release of 36 cfs from the existing powerhouse and 156 cfs from the new powerhouse totals 192 cfs. When license requirements exceed 192 cfs, SMUD will make up the difference by releasing the necessary additional water from either the jet ring valve on the dam or the new boating flow valve. For example, the license-required minimum flow requirement of 222 cfs in early April of most water years will be met by releasing 156 cfs at the new powerhouse plus 36 cfs from the dam, plus 30 cfs at the boating release valve.
During periods when SMUD is implementing boating flows, SMUD will fully open the ring jet valve at Slab Creek Dam to facilitate floating/walking boats from the proposed put-in to the powerhouse area, a distance of approximately 100 yards. A wide open ring jet valve will produce a release of between 200 and 250 cfs, depending on the water level of Slab Creek Reservoir. The balance of the boating flow target will be delivered by the new powerhouse and boating release valve adjacent to it. For example, when the boating flow target is 1,500 cfs, the combined releases will consist of 250 cfs from Slab Creek Dam (or maximum capability), 156 cfs from the powerhouse tailrace, and 1,094 cfs from the boating flow valve. During boating flow releases, a ramping rate of 1-foot-per-hour will apply to the ramp up and down of releases from Slab Creek Dam and the combined releases of the powerhouse and boating flow valve.

This operation plan will require a change in the minimum release compliance location. Under the new license, the compliance gauge is USGS Gauge 11443500, located at the existing Slab Creek Dam Powerhouse. With the Project in place, the gauge location will be the new powerhouse itself, as an acoustic-type flowmeter will be located in the penstock leading to the powerhouse and boating release valve. This flowmeter, along with measurements of released water at the dam, will be used to demonstrate compliance with the minimum requirements, boating releases, and ramping rates. With respect to ramping rates, the conversion of flow measurements in the penstock to changes in river stage will be performed with the aid of the stage-discharge curve from the river gauging station on the SFAR within the ¼-mile reach. The compliance location will move approximately ¼-mile downstream of its present location. Because the flowmeter will be located in the penstock feeding the new powerhouse and whitewater release valve, inflow from Iowa Canyon Creek will not be incorporated into compliance reporting despite the fact the compliance location will be 200 feet below the confluence of the creek with the SFAR. SMUD will continue to operate USGS Gauge 11443500.

Operation of and water use in Slab Creek Reservoir will change slightly as a result of the Project. With the new powerhouse in operation, raising the level of Slab Creek Reservoir to create a white water boating spill will not be required. Water surface elevations of the reservoir during boating releases will revert to normal fluctuations below the 1,850-foot spillway elevation. The Project, however, will not alter the incidence of uncontrolled spill events passing over Slab Creek Dam in spring of certain years. Spill magnitude, frequency and duration will be largely unaltered, with the majority of these events occurring in above-normal and wet water years. The volume of water passing through the White Rock Tunnel for power generation at the White Rock Powerhouse will be unaltered as well.
EXHIBIT C

3.3 Construction Activities and Schedule

Construction of the Project will occur over a two-year timetable. The primary construction activities are listed below, followed by more detailed descriptions of major activities, as described in the conceptual construction plan (MWH 2010c). SMUD will prepare a comprehensive final construction plan prior to commencing construction activities.

- Perform pre-construction geotechnical investigation
- Establish staging area
- Establish access to construction site
- Prepare construction site and locate construction trailers
- Install White Rock tunnel tap and Slab Creek penstock
- Install cofferdam along SFAR left bank
- Excavate for and construct powerhouse, tailraces, and valve vault
- Complete yard fill
- Install turbines, generators and balance-of-plant powerhouse equipment
- Re-vegetate disturbed areas
- Complete electrical interconnection

3.3.1 Pre-construction Geotechnical Investigation

In order to develop final design specifications for the Project, SMUD will perform geotechnical studies of the construction areas. The site-specific geotechnical investigation and field work will generate a geotechnical data report to be used in developing the final design of the Project.

3.3.2 Establish Staging Area

The available space at the construction sites is inadequate to accommodate parking for the construction worker vehicles and equipment delivery vehicles that will arrive during the construction period. As a result, SMUD will use a remote staging area located near U. S. Highway 50. The staging area will serve as an off-street park-and-ride location for the construction workers. It will also be used to process and stage materials and equipment in transit to the construction site. Construction workers will park their vehicles at the staging area and travel to and from the Project site in carpools or vanpools. Delivery trucks will stage at the area, and then be directed to the work site during specified time frames between 9:00 a.m. and 2:00 p.m.
3.3.3 Establish Access to Construction Site

Access to the construction site will be on local roads within the town of Camino. The route will likely involve portions of Carson, Larsen, and North Canyon roads. From North Canyon Road, construction traffic will transit down Slab Creek Road, a gravel road currently used for access to Slab Creek Dam by SMUD operators as well as to Slab Creek Reservoir and the SFAR by recreationalists. From the terminus of Slab Creek Dam Road, the adit portal can be accessed via the still-existing, concrete-surfaced old Slab Creek Dam construction road. Gated because of its steepness, the access road leads down to the east bank of Iowa Canyon Creek, where an existing steel bridge crosses the creek to the adit portal area. Thus, while the construction road will require maintenance and environmental controls, access to the old construction site will not involve a riverbed crossing as all facilities associated with the Project, including the proposed whitewater boating put-in, will be located on the south bank of the SFAR.

Scheduling of construction traffic from the staging area onto the streets of Camino will be employed to reduce incompatibility with school buses and children walking to and from bus stops. Most of the morning construction worker traffic will occur between 5:30 a.m. and 6:30 a.m., in advance of the morning school bus pick-up times of 7:00 a.m. to 8:00 a.m. Most material deliveries to the construction site will occur between 9:00 a.m. and 2:00 p.m. when children are in school. Vanpools carrying construction workers will travel back to the staging area between 3:30 p.m. to 4:30 p.m.

Currently, a bridge fashioned from a railroad flatcar spans approximately 90 feet over Iowa Canyon Creek. Because the bridge does not satisfy OSHA requirements, it will be replaced with a pre-engineered, traffic-rated, code-compliant bridge/culvert.

A turnaround and small parking area next to the new powerhouse will be located at the termination of the powerhouse access road, just across the bridge. This will accommodate SMUD maintenance vehicles and whitewater boaters accessing the whitewater boating put-in.

3.3.4 Prepare Construction Site and Locate Construction Trailers

Site preparation will include preparation of areas for on-site Project office facilities and for staging of materials. Some minor vegetation clearing will be required in the area of the new powerhouse, but few mature trees are expected to be removed (see Section 5.5.2). A source of temporary power will be created to electrify the construction site. Before any activities are undertaken at the site, stream sediment control and erosion protection will be installed around areas that will be cleared and graded or used for staging/laydown. Best Management Practices (BMPs) employed at the Project site may include: (1) silt fences and straw bale barriers; (2) fiber rolls across disturbed slopes; and (3) maximum slope inclinations on soil stockpiles, and construction road stabilization.
Because of the limited area available at the site, it is assumed only two trailers will be positioned upstream of the construction site near Iowa Canyon Creek: one for use by the contractor and the other for use by SMUD. The contractor may stage additional trailers, laydown areas, warehousing facilities, or storage such as conex containers, along the existing footpath that runs upstream towards the existing pedestrian footbridge.

3.3.5 Install White Rock Tunnel Tap and Penstock

Construction of the penstock will be performed entirely within the 400-foot-deep adit. Connecting the 8-foot-diameter steel penstock to the existing White Rock Tunnel steel bulkhead door within the adit will be accomplished primarily through a multi-step welding procedure that will require draining the White Rock Tunnel for a short period of time. The penstock will be fully encased within concrete for approximately 50 feet beginning at the bulkhead, consistent with the existing 50-foot, concrete-lined section of the adit. The subsequent penstock sections, for approximately 350 feet to the adit portal, will be constructed on concrete saddles.

3.3.6 Install Cofferdam along SFAR South Left Bankline Powerhouse

The powerhouse foundation and tailrace will be constructed on the left bank of the SFAR at a riverbed bottom elevation of approximately 1,632 feet. This will require the construction of a temporary cofferdam to dewater the construction area, while allowing the river to pass around the area. While it is anticipated the cofferdam can be installed under normal low flow conditions of the new license (63-70 cfs in August), SMUD may seek a short-term variance from the minimum release requirements at Slab Creek Dam if necessary to achieve installation.

3.3.7 Excavate for and Construct Powerhouse, Tailraces, and Valve Vault

Once the cofferdam is in place, SMUD will excavate the area that will serve as the foundation for the powerhouse and tailrace areas. Some of the rock present at the new powerhouse location will require presplit blasting and production blasting to excavate the foundation. Blasting is not expected to last more than a few weeks, with one or two daytime blast sets occurring within each week.

Material excavated from the powerhouse site will be utilized, where practical, in the embankment for the access road and yard at the powerhouse site, although the total excavated material is expected to be relatively small in volume. Excavated materials that are unsuitable for use in the powerhouse area will be hauled to a waste area.

A secondary source of rock for construction needs is the mouth of Iowa Canyon Creek. As discussed in Section 5.1, streambed sediment in the creek has aggraded to the extent it has formed an elevated mouth which influences the characteristics of the streamflow in the creek (i.e., surface vs. subsurface) as it enters the SFAR. Thus, SMUD proposes to remove a portion of the sediment in the lowermost 140-ft segment of New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)
Iowa Canyon Creek on SMUD-owned land. This material will be removed for two purposes: (1) to create rock fill material and concrete aggregates for the powerhouse construction site, such as the yard and embankments; and (2) to return lower Iowa Canyon Creek to a more natural grade and streambed width to allow flow and biological connectivity to the SFAR during periods of low flow. Prior to construction, SMUD will develop an Iowa Canyon Creek Reconfiguration Plan in consultation with resource agencies.

Once rock excavation under the powerhouse footprint is complete, the foundation area will be cleaned for placement of concrete. Concrete placement will proceed upward from the bottom of the tail race up to the turbine floor at elevation 1,651.50 feet. The walls and roof of the powerhouse will be constructed to elevation 1,676 feet. The powerhouse structure will be topped out with a penthouse structure. This structure will provide secure access to the powerhouse during times of high flow.

The valve vault will be constructed on rock on the south bank of the SFAR, along the river edge. The finished structure will be a reinforced concrete housing that will contain an isolation butterfly valve and a fixed-cone valve with hood to dissipate the effects of the boating water discharge into the river. The outlet work will be designed and oriented in a downstream direction along the left bank of SFAR. Water released from the valve will enter an energy dissipating structure designed to minimize deleterious effects of water spray on whitewater boaters negotiating rapids adjacent of the facility.

At 1,675 feet in elevation, the roof of the valve vault will be level with the yard constructed behind the powerhouse, thereby subjecting the structure to submergence in floods greater than a 100-year event. Accordingly, the electrical controls in this vault will be in waterproof cabinets or they will be installed in the powerhouse with the cabling routed through a waterproof duct between the valve vault and powerhouse structures.

A total of 1,700 cubic yards of concrete has been estimated for all construction activities. To minimize traffic impacts, SMUD plans to evaluate the option of batching concrete on site. A portable batch plant would be staged near Iowa Canyon Creek and include a controlled perimeter to contain concrete washout. Cement and aggregate materials would be transported to the site as dry material in one-cubic-yard sacks and mixed as needed. SMUD will evaluate the possibility of using the rock removed from the mouth of Iowa Canyon Creek for concrete and fill aggregate.

3.3.8 Complete Yard Fill

The powerhouse yard and associated retaining walls will be constructed around the powerhouse. The powerhouse yard will be constructed approximately 25 feet above the existing riverbed bottom, to ensure the powerhouse is accessible up to a 100-year flood. To minimize rock import and to keep fill material from encroaching into the river, reinforced earth or concrete retaining walls will be constructed.
3.3.9  Install Turbines, Generators and Balance of Plant Powerhouse Equipment

The installation of turbines, generators, valves, and balance of plant powerhouse equipment will be performed within the powerhouse and valve vault structures as the concrete structure is being placed and through roof hatches.

3.3.10  Re-vegetate Disturbed Areas

Temporary use areas, earth embankments, and minor cut and fill areas will be revegetated following construction activities in and around the powerhouse construction site. A native grass and/or forb seed mix combined with seeds of other shallow-rooted woody or perennial vegetation will be applied to the land in conformance with USFS guidelines, likely in combination with erosion control matting and/or hydroseed for interim erosion control.

3.3.11  Complete Electrical Interconnection

Electrical connection of the new generators to the electrical grid at the existing 12 kV distribution circuit at the White Rock Tunnel Gate House will be made via overhead wire, supported on wooden power poles (Figure 3.3.11-1). Approximately 10 power poles will be erected to hold the power-line. The generator output will pass through a step-up transformer to match the distribution voltage. The step-up transformer and disconnect structure will be located on the south side of the valve house.

3.3.12  Schedule

The schedule for construction of the New Slab Creek Powerhouse and boating flow valve is provided in Table 3.3.12-1.

The construction activities will begin with construction of the boating release valve first, followed by construction of the powerhouse. This sequence is designed to ensure compliance with the license requirement to achieve the full capability to release minimum flows by license Year 4, as the boating flow valve will be fully capable of releasing all minimum flows.
Figure 3.3.11-1: Proposed alignment of New Slab Creek Powerhouse Powerline, connecting new powerhouse transformer to existing White Rock Tunnel Gate House

New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)
Table 3.3.12-1. Proposed Schedule of UARP License Amendment Process for New Slab Creek Powerhouse and Boating Flow Valve Project.

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<td>SMUD/agencies Develop Iowa Canyon Creek Reconfiguration Plan</td>
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New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)

August 2014
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<th>Table 3.3.12-1. Proposed Schedule of UARP License Amendment Process for New Slab Creek Powerhouse and Boating Flow Valve Project.</th>
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<td>OE Develops Draft Construction Plan</td>
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<td>OE Develops Cost Report</td>
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<td><strong>PROJECT CONSTRUCTION ACTIVITIES</strong></td>
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<td>Iowa Canyon Creek Reconfiguration and Bridge</td>
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<td>Road Improvements and Transmission Line</td>
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<td>White Rock Tunnel and Adit Connection</td>
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<td>Penstock, Boating Flow Valve and Energy Dissipater</td>
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<td>Procurement of Turbine/Generator Package</td>
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<td>Powerhouse and Balance of Plant (Completed Q1 2018)</td>
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<td>Commission (Q2 2018)</td>
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<tr>
<td>SFAR Habitat Improvement</td>
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<td>SFAR Gravel Augmentation</td>
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EXHIBIT D

3.4 Costs and Financing

SMUD has prepared this Exhibit D as part of its application for a license amendment from FERC for the UARP. In this exhibit, SMUD provides annual generation value for the New Slab Creek Powerhouse, as well as costs for construction, environmental measures, and license amendment application development. Costs provided in this exhibit cover the new powerhouse facility as well as the boating release valve adjacent to it. The cost of the Project is based on the conceptual design and operational plans described in Exhibits A and B, which may be modified in the future. All costs are provided in 2013 U.S. dollars. In brief, the New Slab Creek Powerhouse Project will not only provide SMUD with 2.7 MW of additional local capacity, it will also contribute approximately 10.5 GWh of non-carbon energy annually to the California electric grid.

3.4.1 Project Costs

The New Slab Creek Powerhouse Project, including the boating flow release valve, will incur a number of developmental costs in the general areas of: (1) construction; (2) environmental mitigation; and (3) license amendment preparation/permitting. The Project will not result in any costs associated with modifying SMUD’s UARP water rights or purchasing land. The new powerhouse and boating valve will be constructed on SMUD-owned land, while the new powerline will lie partially on land owned by the USFS.

3.4.1.1 Costs Related to Construction of the New Slab Creek Powerhouse

In developing the conceptual design of the new powerhouse, SMUD planners utilized, to the greatest extent possible, existing UARP infrastructure to minimize costs and reduce local environmental effects. For example, the proposed development utilizes the existing UARP White Rock Powerhouse Tunnel and Adit #3 as the means by point of release for the majority of the minimum and boating release requirements from Slab Creek Reservoir (see Exhibit B). SMUD estimates the Project construction cost, with contingencies, would total about $13 million in 2013 dollars (Table 3.4.1-1).

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<tr>
<td>Major Equipment (turbine, valves)</td>
<td>$2,975,000</td>
</tr>
<tr>
<td>Powerhouse Energy Dissipater</td>
<td>$881,000</td>
</tr>
<tr>
<td>Concrete (powerhouse, boat valve)</td>
<td>$1,307,000</td>
</tr>
<tr>
<td>Mechanical</td>
<td>$1,225,000</td>
</tr>
<tr>
<td>Electrical (powerhouse, powerline)</td>
<td>$800,000</td>
</tr>
<tr>
<td>Architectural</td>
<td>$84,000</td>
</tr>
<tr>
<td>Power Tunnel Connection</td>
<td>$505,000</td>
</tr>
</tbody>
</table>

Table 3.4.1-1. Estimated construction cost for the New Slab Creek Powerhouse Project, including the boating flow valve (2013 Dollars).
Table 3.4.1-1. Estimated construction cost for the New Slab Creek Powerhouse Project, including the boating flow valve (2013 Dollars).

<table>
<thead>
<tr>
<th>Construction Component</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtotal</td>
<td>$9,025,000</td>
</tr>
<tr>
<td>Civil contingency (10% of above)</td>
<td>$1,354,000</td>
</tr>
<tr>
<td>Management</td>
<td>$800,000</td>
</tr>
<tr>
<td>Final Engineering/Design</td>
<td>$1,800,000</td>
</tr>
<tr>
<td><strong>Total Construction Cost with Contingencies</strong></td>
<td><strong>$12,979,000</strong></td>
</tr>
</tbody>
</table>

Indirect costs associated with construction (construction equipment, etc.), engineering and design, overhead, and legal services are included in the total construction cost, with contingencies. SMUD assumes interest during construction will accrue at a four percent annual percentage rate on the outstanding balance at the end of each month. Based on this assumption, SMUD estimates the total interest during the two-year-long construction period will be approximately $900,000. Taxes are estimated to be in the range of $200,000 to $250,000.

3.4.1.2 Costs Related to Non-flow Environmental Measures of Proposed Project

SMUD will expend approximately $400,000 in capital related to implementation of non-flow related environmental measures of the proposed Project. This involves implementation of two key measures: (1) SFAR Gravel Augmentation Plan; and (2) SFAR Habitat Improvement Plan. Maintenance costs for these two measures are expected to be minimal or non-existent. Costs of other environmental protection measures are built into the overall construction plan costs. This would include the Storm Water Pollution and Protection Plan, Erosion and Sediment Control Plan, Fire Protection Plan, Avian Protection Plan, and Iowa Canyon Creek Reconfiguration Plan.

3.4.1.3 Costs to Prepare License Amendment Application

SMUD estimates the cost to prepare the License Amendment Application to be $1,140,000. This cost reflects SMUD’s internal administrative costs, expenditures for outside consultants, including the cost to complete studies, and the cost for the pre-filing consultation process with the stakeholders through December 2012 (Table 3.4.1-2). The costs do not include any estimated cost to complete the licensing process (post-filing, pre-license amendment issuance) or implementation of license amendment conditions.

Table 3.4.1-2. Summary of costs to prepare license amendment application (2012 Dollars).

<table>
<thead>
<tr>
<th>Item</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside Contractor Study Costs</td>
<td>$ 603,000</td>
</tr>
<tr>
<td>SMUD Labor</td>
<td>$ 200,000</td>
</tr>
<tr>
<td>Consulting and Administration</td>
<td>$ 337,000</td>
</tr>
<tr>
<td><strong>Total Cost (through December 2012)</strong></td>
<td><strong>$ 1,140,000</strong></td>
</tr>
</tbody>
</table>
3.4.1.4 Total Annual Project Costs

The total average annual Project costs of the New Slab Creek Powerhouse Project are estimated to be $843,000 (Table 3.4.1-3). Annual operations and maintenance costs for the New Slab Creek Powerhouse and Boating Release Valve are estimated to be approximately $100,000. This is based on annual costs for similarly sized hydro powerhouses in the UARP.

<table>
<thead>
<tr>
<th>Item</th>
<th>Total Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Expense(^a)</td>
<td>$228,000</td>
</tr>
<tr>
<td>Equity(^a)</td>
<td>$134,000</td>
</tr>
<tr>
<td>Depreciation Expense(^b)</td>
<td>$279,000</td>
</tr>
<tr>
<td>Fixed O&amp;M</td>
<td>$100,000</td>
</tr>
<tr>
<td>Capital Investments(^c)</td>
<td>$30,000</td>
</tr>
<tr>
<td>License Application Costs(^d)</td>
<td>$53,000</td>
</tr>
<tr>
<td>Non-flow-related environmental measures</td>
<td>$19,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$843,000</strong></td>
</tr>
</tbody>
</table>

\(^a\) Assumes 80/20 debt/equity ratio, 5.5% average debt rate, 8% equity return, adjusted for inflation

\(^b\) Depreciation expense based on 50 yr. asset life

\(^c\) Replacement and upgrade costs amortized over asset life

\(^d\) Amortized over asset life

3.4.2 Value of Project Power

In this section, the amount and value of power is described and tabulated, utilizing FERC’s current cost valuation approach by applying SMUD’s 2013 Feed-In Tariff (FIT) for Renewable Power Delivery. Because the Northern California power market is expected to remain highly uncertain and volatile, long-term price reliability continues to be a challenge. While the current cost approach provides a reasonable snapshot of the relative value of various alternatives, valuations will be subject to change based upon market, regulatory, and/or legislative conditions.

The average annual energy generation for the New Slab Creek Powerhouse Project is estimated to be 10,576 MWh. This projected average annual generation is based on a simulation of energy produced at the new powerhouse over a representative 25-year period of 1975 to 2000. The variability in generation over this period reflects the variable minimum release requirements at Slab Creek Reservoir in different water year types. In Critical Dry water years, when the release requirement is lowest, the new powerhouse will yield approximately 4,000 MWh; whereas in Wet water years, powerhouse generation will increase to approximately 14,000 MWh. This annual variability in generation will occur throughout the license term. The range of annual generation values will remain constant, with year-to-year variability simply reflecting the natural ordering of different water year types through time.

For valuing energy for the New Slab Creek Powerhouse Project, SMUD utilized the 20-year levelized FIT price seasonally-adjusted and discounted to real dollars. Because

New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLAA)
the Project will operate in a mode similar to run-of-river, SMUD has computed the value of energy using seasonal on-peak and off-peak prices and apportioned the total value based on the portion of the day that is on-peak vs. off-peak. The definitions of on-peak and off-peak generation used are consistent with those defined by the WECC. As such, the annual average of the Slab Creek generation value is estimated at $81/MWh. With this value, an annual generation level of 10,576 MWh converts to an energy value of $855,000.

The average annual net energy value of the New Slab Creek Powerhouse Project is estimated to be $12,000 (Table 3.4.2-1).

<table>
<thead>
<tr>
<th>Table 3.4.2-1. Average annual net benefit for New Slab Creek Powerhouse Project (2013 Dollars).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Total Energy Value</td>
</tr>
<tr>
<td>Costs</td>
</tr>
<tr>
<td>Average Annual Net Benefit</td>
</tr>
</tbody>
</table>

3.4.3 Source of Financing

Annual financing for the existing UARP is provided through issuance of revenue-backed bonds. SMUD does not issue project-specific debt for the UARP. While this practice is likely to be continued for the New Slab Creek Powerhouse Project, no decision has been made in this regard as of the filing of the License Amendment Application.
 ENVIRONMENTAL REVIEW PROCESS

This section of the FNLAA contains a review of environmental review requirements applicable to the New Slab Creek Powerhouse Project. It also contains a discussion of the consultation process that has occurred to date under the requirements of the FERC license amendment process.

4.1 Applicable Laws, Ordinances, Regulations, Statutes and Plans

As discussed in Section 1.0 of this document, SMUD intends to apply to FERC for an Amendment of License for the UARP to add the Project to the Slab Creek/White Rock Development. In issuing a license amendment granting SMUD the right to construct the Project, FERC will evaluate the environmental implications of their action pursuant to the National Environmental Protection Act (NEPA) of 1969.

The California Environmental Quality Act (CEQA) of 1970 (as amended) is the relevant state law under which the environmental effects of state-agency decisions to permit the Project must be analyzed. SMUD will serve as the Lead Agency under CEQA for purposes of developing a separate CEQA document, which will tier off the FERC NEPA document, to support the decisions of SMUD and other state agencies. When a project requires compliance with both CEQA and NEPA, state and local agencies use the NEPA EA rather than preparing a parallel CEQA document under certain conditions. These conditions are: (1) the EA complies with CEQA Guidelines; and (2) the EA precedes the CEQA process. Because NEPA does not require a separate discussion of mitigation measures or growth-inducing impacts, those points of analysis, if missing from the NEPA EA, must be added or supplemented before it can be used as a CEQA document. (CEQA Guidelines § 15221).

In addition to the State and Federal environmental review processes, SMUD must comply with other federal, state, and local laws, ordinances, regulations, and statutes. Comprehensive plans and programs have been developed that include policies and guidelines for management of natural resources present in the vicinity of the Project. The primary laws and their application to resources in the Project area are summarized below.

4.1.1 Clean Water Act Section 401 Water Quality Certification

The Clean Water Act (CWA) is the most significant legislation regarding water use and quality related to the Project. The CWA requires the United States Environmental Protection Agency (USEPA) to adopt water-quality standards for surface waters within the United States. These standards consist of designated beneficial uses and water-quality criteria to support those beneficial uses. As provided for in the CWA, the

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4 The U.S. Endangered Species Act and California Endangered Species Act do not apply to the New Slab Creek Powerhouse Project as no federally or State listed species were identified at Slab Creek Dam and Reservoir during the UARP relicensing.
USEPA has assigned administration of the CWA for California waters to the State of California. The Porter-Cologne Water Quality Act is California’s comprehensive water-quality control legislation and designates the Regional Water Quality Control Boards (RWQCBs) responsible for CWA programs.

To meet their requirements under the CWA as well as the Porter-Cologne Water Quality Act, the RWQCBs prepared and adopted water-quality control plans, also known as “basin plans,” for major California watersheds. These plans consist of: (1) a designation of existing and potential beneficial uses; (2) water quality objectives to protect those beneficial uses; and (3) programs and implementation needed to achieve those objectives. The RWQCBs are required to consider a number of items when establishing water quality objectives, including: (1) past, present, and probable future beneficial uses; (2) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (3) water quality conditions that could reasonably be achieved through the coordinated control of all factors that affect water quality in the area; and (4) economics. SMUD will accordingly file an application with the SWRCB for an amendment to the UARP 401 Water Quality Certification for the Project as part of the license amendment process.

4.1.2 Clean Water Act Section 404 Dredge and Fill Permit

Section 404 of the CWA requires that any party wishing to dredge or place fill material in navigable waters of the United States must first consult with the US Army Corps of Engineers (USACE) to determine whether a permit is necessary and, if so, obtain the required permit. When issuing this permit, the USACE must consult with the SWRCB regarding compliance with Section 401 of the CWA and with the US Fish and Wildlife Service (USFWS) regarding compliance with Section 7 of the Federal Endangered Species Act (ESA). Section 404 guidelines direct that no permit to discharge, dredge, or fill material shall be granted if it jeopardizes water quality, a listed threatened or endangered species, or adversely affects a listed species critical habitat. Two aspects of the Project will trigger the need for a 404 Permit from the USACE: (1) construction of the powerhouse foundation within the Waters of the U.S. (i.e., the SFAR); and (2) construction of a new bridge across Iowa Canyon Creek. SMUD will accordingly file an application for 404 Permit for the Project as part of the license amendment process.

4.1.3 California Fish and Wildlife Code Section 1602 Streambed Alteration Agreements

Section 1602 of the California Fish and Wildlife (CDFW) Code requires anyone to submit plans to the CDFW for review and approval for any activity that will: (1) substantially divert or obstruct the natural flow or the bed, channel, or bank of any river, stream, or lake; (2) substantially use or change any material from the bed, channel, or bank of any river, stream, or lake; or (3) dispose of or deposit debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into any river, stream, or lake. If an existing fish or wildlife resource may be substantially adversely affected by the activity, CDFW must issue a streambed alteration agreement.
including reasonable measures necessary to protect the resource. Because the Project will alter portions of the SFAR and Iowa Canyon Creek, SMUD will provide notification to the CDFW related to the need for a Streambed Alteration Agreement.

4.2 Consultation under FERC Requirements

The New Slab Creek Powerhouse represents a non-capacity amendment that involves the addition of new water power turbines. For this type of amendment, FERC regulations (18 CFR §4.38 (a)(6)) require a three-stage consultation process, including two stages prior to the filing of the application and one post-filing.

SMUD began the consultation process by releasing an Initial Consultation Document (ICD) for the New Slab Creek Powerhouse Project in October 2011 (SMUD 2011). Following the ICD release, SMUD hosted a joint agency/public meeting to answer questions and visit the proposed Project site on December 1, 2011. The joint meeting was noticed in the Sacramento Bee and Placerville Mountain Democrat newspapers on November 22, 2011. A recording of the meeting was submitted to FERC and other parties requesting the recording. Requests for additional meetings received during the joint meeting resulted in a second meeting on January 17, 2012 in the town of Camino, and the third meeting January 18, 2012 in the community of Swansboro. The focus of these secondary public meetings was an improved understanding of the relationship between the New Slab Creek Powerhouse Project and UARP relicensing, including the Iowa Hill Pumped-storage Development. Formal comments on the ICD were received by SMUD from 15 parties in January and February of 2012.

On February 1, 2012, SMUD conducted a separate meeting to discuss the Project and address issues/concerns raised by resource agencies, non-governmental organizations, and representatives of the whitewater boating community. Subsequent meetings with these entities occurred on April 25 and August 16, 2012, in which the issues of appropriate studies and environmental protection/mitigation measures were discussed. During these meetings, SMUD prepared new information not contained in the technical reports on the subject of wetted width and surface flow as a function of streamflow within the ¼-mile reach (see Appendix E, Additional Informational Items #1-3). Agreement was reached January 9, 2013 between SMUD and the resource agencies on the subject of flow levels in the ¼-mile reach, and other mitigation measures identified in Section 3.1.3.

On May 8, 2013, SMUD released the DNLAa for the Project. The DNLAa included all measures contained in the January 9, 2013 agreement with the resource agencies. Copies of the document were sent to all resource agencies, NGOs, and members of the public who had expressed interest in the project during three public meetings associated with the Initial Consultation Document. SMUD requested comments from all parties within 90 days of the DNLAa release.
Formal comments on the DNLAA were received from 21 parties from June 4 through August 9, 2013 (Table 4.2-1). Copies of each comment letter/email are included in Appendix B, followed by a matrix table of responses to individual comments in Appendix C.

Table 4.2-1. Comment letters received on New Slab Creek Powerhouse Draft License Amendment Application.

<table>
<thead>
<tr>
<th>Entity</th>
<th>Date of Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Stanley (IHJAC Member, CCAC, Camino Resident)</td>
<td>June 25, 2013</td>
</tr>
<tr>
<td>Mike DeBord (Camino Resident, IHJAC Member)</td>
<td>June 30, 2013</td>
</tr>
<tr>
<td>El Dorado County, Board of Supervisors</td>
<td>July 11, 2013</td>
</tr>
<tr>
<td>California Dept. of Parks &amp; Recreation, Office Historic Preservation</td>
<td>July 17, 2013</td>
</tr>
<tr>
<td>Garry Dykstra (private citizen)</td>
<td>August 1, 2013</td>
</tr>
<tr>
<td>Jim Summers (private citizen)</td>
<td>August 3, 2013</td>
</tr>
<tr>
<td>American Whitewater</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>American River Recreation Association</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>California Outdoors</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>Hilde Schweitzer (private boater)</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>Ian Buckley (private boater)</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>California State Water Resources Control Board</td>
<td>August 5, 2013</td>
</tr>
<tr>
<td>Lindell Price (private citizen)</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>Stanley Price (private citizen)</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>Melba Leal (private citizen)</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>Robert Smart (private citizen, EDC Parks and Rec. Commission)</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>USDA Forest Service</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>USDI Bureau of Land Management</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>California Department of Fish and Wildlife</td>
<td>August 6, 2013</td>
</tr>
<tr>
<td>Iowa Hill Action Committee</td>
<td>August 9, 2013</td>
</tr>
</tbody>
</table>
EXHIBIT E

5.0 ENVIRONMENTAL ANALYSIS

This section of the document presents preliminary findings of the potential environmental consequences of the Project. These findings are based on information gathered during the UARP relicensing studies, supplemented by focused surveys performed in the affected area in 2010. Given the nature of the Project and the results of the 2010 surveys, SMUD envisions no unmitigatable environmental impacts, yet a final determination of impacts and corresponding mitigation will be developed in consultation with resources agencies and other interested parties as part of the NEPA and CEQA processes.

Construction and operation of the Project have the potential to affect a variety of natural, cultural, and socioeconomic resources. With respect to aquatic resources, the area primarily affected by construction and operation are the SFAR and Iowa Canyon Creek. Construction activities will affect the SFAR primarily at the location of the proposed new powerhouse. In Iowa Canyon Creek, the area affected by construction is the segment of stream adjacent to the new bridge and rock excavation zone at the mouth of the stream. Operational effects are limited to the SFAR, specifically the ¼-mile reach of river between Slab Creek Dam and the location of the proposed new powerhouse. The phrase “¼-mile reach” will be used throughout this section of the FNLAA to refer to this segment of the river.

The Project will be constructed partially within the SFAR channel. The extent of Project effects on the river corridor is described in this section with respect to two agency definitions. CDFW describes the river channel as the Waters of the State, defined as the portion of the river channel that restricts lateral movement of water. Although not adopted as part of a regulation, CDFW prefers to delineate Waters of the State in the field as either the top of the bank or the outer edge of riparian vegetation, whichever is more landward. In addition, the USACE defines the Waters of the U.S. area within the ordinary high water mark (OHWM). The OHWM is defined by a line along the river shore that is established by water fluctuations as reflected in physical characteristics, such as bank conditions, riparian vegetation, or other characteristics of the surrounding area.

Figure 5.0-1 depicts the delineation of Waters of the U.S. and Waters of the State in reference to the proposed location of the new powerhouse and appurtenant facilities. The effect of the Project on these jurisdictional waters is discussed in Section 5.2.
Figure 5.0-1: Preliminary jurisdictional waters and wetlands in the Survey Area in relation to the footprint of the New Slab Creek Powerhouse Project.
5.1  Geological and Geomorphological Resources

5.1.1  Affected Environment

The geology of the Project area was first examined prior to the construction of Slab Creek Dam, White Rock Powerhouse Tunnel, and Adit #3. In the case of Slab Creek Dam, the rock in the right abutment and river channel area was identified as unweathered hard quartz mica schist (similar to phyllite, but affected by more thermal and dynamic metamorphism) and hornfels. Several basaltic dikes were also encountered. A vertical shear zone parallel to the river was also identified crossing the dam foundation at the channel axis. The shear zone was described as “relatively impermeable and strong below foundation grade”. The upper portion of the left dam abutment was found to consist primarily of diorite and granodiorite with a small band of quartz-mica schist. Overall, rock exposed over the entire foundation was considered excellent. The granitic rocks in the right abutment were considered very hard and contained only a few tight, interlocked joints.

Excavation for the intake structure and eastern portion of the White Rock Tunnel and Adit #3 revealed hard mica-quartz schist. The schist was exposed over the initial 300 feet of the tunnel until a gradational contact between the schist and granitic rocks were encountered. Rocks in this gradational contact consisted of a granitic gneiss that contained a few shear zones with fat (clay-rich) mylonitic gouge.

The morphology of the SFAR downstream of Slab Creek Dam, in common with most canyon-bound rivers, is forced by the presence of bedrock in the bends and banks of the channel as well as the presence of very large, colluvially derived boulders that have been to some extent rearranged by very high flows into stable, energy-dissipating structures (Tetra Tech 2011). As an added complication, the morphology of the channel between the dam and the mouth of Iowa Canyon Creek is also influenced by angular waste-rock from dam construction in the 1960s (Appendix A, Photos 8 and 9). Waste-rock appears to have been dislodged and piled up by plunging flows over the dam that created high-energy jets to form the stilling basin downstream of the dam. Many of the angular boulders in the high elevation bar that forms the downstream control for the stilling basin exceed 2 m in diameter. The average bed slope within the ¼-mile reach is about 0.02 (106 ft/mile), but the local bed slope within the reach varies from as high as 0.06 to as low as 0.005.

The lower 500 feet of Iowa Canyon Creek, that portion that lies between the mouth of the creek and a large waterfall/cascade complex, contains a variety of bed material from different sources and origins. Present are alluvial materials transported from upstream reaches of the creek and colluvial rock that has entered the stream from landslides and erosion along the lower 500 feet of creek. The streambed also contains remnant materials from the construction of Slab Creek Dam in the 1960s: large concrete slabs and a rock fill material originally placed along the creek and SFAR for roads and equipment laydown. This streambed sediment has aggraded the lowermost 100 feet of
the creek, forming an elevated mouth which influences the characteristics of the streamflow as it enters the SFAR.

During the summer of 2010 surface water in the creek was observed to percolate into the stream alluvium directly below the waterfall/cascade complex leaving a dry streambed (Appendix A, Photo 10). Streamflows measured below the complex during summer 2011 confirmed the 2010 observations, demonstrating a consistent pattern of decreasing surface flow moving downstream, ultimately leading to a point of zero surface flow, which gradually moved upstream throughout the summer and fall (Table 5.1.1-1). On August 16, 2011, while the surface flow was less than 1.0 cfs just below the complex and zero at the existing bridge, interstitial flow resurfaced from the banks of the SFAR, but at a location approximately 20 feet downstream of the Iowa Canyon Creek mouth, thus indicating that during periods of low flows, surface water percolates into the fill and likely follows the natural route of the pre-1960 streambed (Appendix A, Photo 11).

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance upstream of SFAR (feet)</th>
<th>June 14</th>
<th>July 13</th>
<th>August 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Slab Creek Road Culvert</td>
<td>1,900</td>
<td>8.3</td>
<td>5.3</td>
<td>3.4</td>
</tr>
<tr>
<td>Below Waterfall and Cascade Complex</td>
<td>450</td>
<td>7.5</td>
<td>3.3</td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>At Existing Bridge over Iowa Canyon Creek</td>
<td>125</td>
<td>7.0</td>
<td>1.7</td>
<td>0.0</td>
</tr>
</tbody>
</table>

5.1.2 Environmental Effects of Project

Construction of the Project could contribute to erosion of exposed soil leading to sedimentation of Iowa Canyon Creek and the SFAR. Before any activities are undertaken at the site, stream sediment control and erosion protection measures will be implemented to minimize erosion in construction areas and the transport of sediment into storm water discharges away from the construction site. Land-based best management practices employed at the Project site may include: (1) silt fences and/or straw bale barriers; (2) fiber rolls laid across disturbed slopes; (3) maximum slope inclinations on temporary stockpiles (if any); and (4) construction road stabilization. The final suite of measures to be applied to the site will be incorporated into an Erosion and Sedimentation Control Plan. The plan will be developed in concert with a Storm Water Pollution Prevention Plan (SWPPP). Both plans will be prepared by a Qualified SWPPP Developer (QSD), in consultation with state and federal resource agencies. SMUD will submit the plan to FERC no later than 90 days before initiating ground disturbing activities. The two plans will be implemented by a Qualified SWPPP Practitioner (QSP), who will also evaluate the adequacy and effectiveness of the erosion control measures throughout Project construction activities.
At the conclusion of construction activities, SMUD will implement further BMPs at the Project site. Temporary use areas, earth embankments, and minor cut and fill areas will be re-vegetated in and around the powerhouse construction site. It is anticipated that a native grass and/or forb seed mix combined with seeds of other shallow-rooted woody or perennial vegetation would be applied to the land, likely in combination with erosion control matting and/or hydroseed for interim erosion control. This will include the planting of alder seedlings in the reconfiguration area of Iowa Canyon Creek to compensate for the loss of alder trees along the SFAR as a result of construction activities.

A temporary cofferdam along the left shoreline of the SFAR will be installed to allow excavation to proceed in a dry work area. All water flow in the SFAR will pass around the cofferdam, allowing for full streamflow volume downstream of the construction area. Clear water accumulating within the dewatered zone will be pumped into the river. Turbid water accumulating in the dewatered zone will be pumped into a settling pool located in the construction site where suspended sediment will be allowed to settle out before the water is returned to the SFAR.

During construction of the Project, SMUD will remove a portion of the sediment from lowermost Iowa Canyon Creek. Some of the rock will be removed as part of the excavation for the foundation for the new bridge to be built across Iowa Canyon Creek. The more significant volume of removed rock will come from the high sediment delta at the mouth of the creek. This material will be removed for two purposes: (1) to create rock fill material for the powerhouse construction site, such as the yard and embankments; and (2) to return lower Iowa Canyon Creek to a more natural grade and streambed width to allow flow connectivity to the SFAR during periods of low flow. Removal of the material will also enhance the natural transport of alluvium and organic matter from upstream sources into lower Iowa Canyon Creek and the SFAR. Because of the implications to aquatic resources in Iowa Canyon Creek and the SFAR, SMUD will develop an Iowa Canyon Creek Reconfiguration Plan in consultation with state and federal resource agencies prior to commencing construction activities.

As part of the Project, SMUD will also move large boulders, concrete debris, and waste rock from the main river channel to a point on top of an existing high lateral bar adjacent to the main channel. This SFAR Habitat Improvement Plan is expected to create aquatic resource riffle habitat and expose surface flow through a 550 foot segment of the ¼-mile reach, between the plunge pool below the dam and the large pool. SMUD will develop a SFAR Habitat Improvement Plan, in consultation with the USFS, CDFW, USFWS, and SWRCB for the rock removal. The plan will also include a post-construction surface flow monitoring sub-plan that will determine the effectiveness of the habitat improvement plan. The plan will be incorporated in the 401 Water Quality Certification, 404 Dredge and Fill Permit, and 1602 Streambed Alteration Agreement.

SMUD will also add spawning gravel to the SFAR as part of the Project. Designed to enhance trout spawning in the ¼-mile reach, the SFAR Gravel Augmentation Plan will...
focus on increasing the amount of spawning gravel in the 600-ft. segment between the large pool and new powerhouse. The plan will involve piling gravel along the SFAR bank near the proposed whitewater boating put-in where it will be entrained and dispersed by fluvial transport to downstream depositional areas such as the lee of large boulders. The approach is logistically straightforward given the presence of a road leading to the boating put-in location; the high flow for fluvial transport will be provided by the spill flows that are common to Slab Creek Dam in Above Normal and Wet water years. SMUD may use source gravel derived from the Iowa Canyon Creek Reconfiguration Plan, if sufficient quantities are available. SMUD will develop a SFAR Gravel Augmentation Plan, in consultation with the USFS, CDFW, USFWS, and SWRCB for the rock removal. The plan will be incorporated into the 401 Water Quality Certification, 404 Dredge and Fill Permit, and 1602 Streambed Alteration Agreement.

The construction and operation of the Project, including the implementation of the three plans discussed above, will not adversely alter the channel bed or river banks of the SFAR. River morphology downstream of Slab Creek Dam is strongly characterized by the presence of bedrock in the bed and banks of the channel as well as the presence of very large colluvially derived boulders that to some extent have been rearranged by very high flows into stable, energy-dissipating structures (Tetra Tech 2011). As a result, water discharge from the proposed new powerhouse will not erode banks or the river bed. Small deposits of gravel derived from Iowa Canyon Creek that lie along the right bank adjacent to the proposed powerhouse site, may be displaced by powerhouse discharge, but will be replenished by the regular recruitment from the creek and the result of the Gravel Augmentation Plan. Water discharged from the boating flow release valve will pass directly into an energy dissipating structure that will reduce much of the force of the water, which will then fall into the river on the left bank downstream of the powerhouse. The left bank of the river at this point is composed of a bedrock outcrop and large, stable boulders delivered to the channel by a rockslide.

5.2 Water Resources

5.2.1 Affected Environment

5.2.1.1 Water Quantity and Hydrology

The Slab Creek/White Rock Development of the UARP is located on the western slopes of the Sierra Nevada Mountain Range. While Slab Creek Reservoir is located on the SFAR, the water supply utilized by this development includes surface runoff accumulated from approximately 760 square miles of the drainage area within the Rubicon River, Silver Creek, and SFAR systems. The drainage area of the SFAR at Slab Creek Reservoir is about 493 square miles and ranges in elevation from 1,850 to almost 10,000 feet. Eventually, the South and North Forks of the American River merge to form the American River at Folsom Lake, which is located in the Sacramento Valley approximately 10 miles east of Sacramento. The American River is a tributary to the Sacramento River, which eventually flows to the Pacific Ocean via the Sacramento-San Joaquin River Delta and San Francisco Bay.

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The major climatic influences in the vicinity of the development include proximity to the Pacific Ocean, terrain features, and alternating high and low pressure regions over the ocean. During summer and fall, high pressure areas typically build up over the ocean, causing a flow of dry and stable air into the basin. Little precipitation falls in the SFAR basin during this time, primarily in the form of occasional thunderstorms. In winter and spring, however, the air is moist and cool, and it releases large amounts of precipitation as it is lifted up and over the Sierra Nevada. The levels of precipitation increase with elevation, with precipitation typically turning from rain to snow above 5,000 feet, depending on the season. The basin receives high runoff during the snowmelt period, which typically extends from March through early July.

The influence of this seasonal variability is evident in the pattern of monthly inflows into Slab Creek Reservoir (Figure 5.2.1-1). This figure from the hydrology study performed for the UARP relicensing (DTA and Hannaford 2005) depicts monthly statistics of “natural” SFAR inflow assuming no regulation by the UARP or the El Dorado Project (FERC Project No. 184). The monthly statistics are developed from daily data between 1975 and 2001. The figure shows the significant variation in natural flows, with median monthly values during summer months (August-October) as low as 100 cfs compared to spring snowmelt values between 1,000-3,000 cfs. The January 1997 flood flow of 70,000 cfs is also represented in the figure. The average annual natural runoff at Slab Creek Reservoir is 783,100 ac-ft.
Figure 5.2.1-1: Monthly Unimpaired Inflows into Slab Creek Reservoir

Natural SFAR Inflow to Slab Creek Reservoir
(Both P184 & Silver Creek Unregulated)
WY 1975-01

100000
10000
1000
100

Average Daily Flow in cfs
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
3rd Quartile
Minimum
1st Quartile
Maximum

3rd Quartile
Minimum
1st Quartile

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Water management in the SFAR basin begins with the headwater project – the El Dorado Project, owned and operated by the El Dorado Irrigation District. Water management facilities of the El Dorado Project include four storage reservoirs in the upper basin and a diversion dam on SFAR near the town of Kyburz. Water leaves the El Dorado Project system at the El Dorado Powerhouse, located approximately one mile upstream of Slab Creek Reservoir. Upper basin water storage is an important element of the UARP, with three primary storage reservoirs (Union Valley, Ice House, and Loon Lake) providing approximately 400,000 ac-ft of capacity. The operation of the UARP follows an annual cycle of reservoir filling and drawdown that coincides with the natural patterns of runoff in the Project headwaters. With the exception of water released into the streams and rivers for recreation and aquatic resource protection, all water stored in UARP reservoirs eventually passes through the 144-MW Camino Powerhouse and into Slab Creek Reservoir.

Slab Creek Reservoir is capable of impounding up to 16,600 ac-ft of water at elevation 1,850 feet. In addition to impounding the local inflow from the SFAR, the reservoir serves as an afterbay to Camino Powerhouse and forebay to the 224-MW White Rock Powerhouse. Because Slab Creek Reservoir is operated as a re-regulating forebay/afterbay, water level in the reservoir fluctuates regularly, with typical fluctuations over the course of a week generally not exceeding 30 feet. During periods when the new FERC license will require boating releases into the Slab Creek Dam Reach, water management at Slab Creek Reservoir will be modified from this basic operation. Because the water release valve at Slab Creek Dam is limited to maximum releases of 263 cfs, boating releases, which are between 850 and 1,500 cfs, must be provided by raising water levels of Slab Creek Reservoir above the spillway crest elevation.

The hydrology of the SFAR between Slab Creek Dam and White Rock Powerhouse, a stretch of 8.0 miles, will change due to the newly-issued UARP License. Under the new license, low flows in the stretch will undergo a substantial change from low flows of the past 30 years. Since 1981, minimum flows released from Slab Creek Dam have been uniformly 36 cfs except in winter and spring of drier water years when flows have been 10 cfs. Under the new license, minimum flows in the river stretch will increase and also exhibit a high degree of variability in accordance with the goal of the parties to the UARP relicensing Settlement Agreement to more closely mimic a natural hydrograph. During the first three years of the new license, flows released from Slab Creek Dam will increase from a low of 63 cfs in summer of Critical Dry water years to springtime highs of 263 cfs in wet water years. In License Year 4, springtime releases will increase to 415 cfs.

Under the new license, high flows resulting from spill will pass through the ¼-mile reach essentially unchanged in frequency, duration, and magnitude from the existing license. However, under the new license additional high flows for whitewater boating will pass through the reach. Flows ranging from 850 and 1,500 cfs will periodically pass over the dam spillway and through the ¼-mile reach. For the first 15 years of the new license,
boating flows will occur over three weekends in springtime of Wet, Above Normal, and Below Normal water years.

5.2.1.2 Water Temperature

Water temperatures in the SFAR directly downstream of Slab Creek Dam are cold throughout the year, exhibiting little summer warming. These conditions are the direct result of the dam releasing cold water from the hypolimnion of the reservoir. As part of the UARP relicensing process, a four-year water temperature monitoring program was performed during the years 2001 through 2004 (DTA 2005a). Under this program, two monitoring stations were located in the ¼-mile reach: one directly downstream of the dam and the other approximately ⅛-mile downstream, just below the pedestrian bridge spanning the river. Daily temperature statistics computed from 15-minute data collected at the site below the pedestrian bridge reveal a thermal regime characterized by normal seasonal fluctuation, limited daily variability, and relatively cold water during summer months (Figure 5.2.1-2). Winter mean daily temperatures range between 3°C and 6°C, while summer mean daily values range between 12°C and 16°C. The limited daily variability is a result of the ¾-mile distance between the dam and the monitoring station, where little warming or cooling was observed relative to the dam release temperatures. These data were confirmed by temperature monitoring performed in 2010, which found water temperatures ranging from 6.1°C in December to 13.2°C in August (Table 5.2.1-1).
Figure 5.2.1-2: South Fork American River ¼-mile downstream of Slab Creek Dam, daily maximum, mean, and minimum water temperature, 2001-2004.
Less is known of the water temperatures in Iowa Canyon Creek. Investigations into the thermal regime of the creek were performed throughout 2010, focusing on the lowest ½-mile of the creek, downstream of the Slab Creek Road crossing. The lowest segment of the creek is in the vicinity of the proposed powerhouse site and reconstructed bridge. A series of spot temperature measurements were made during the year from March through December. Continuous sampling using a recording device was performed during summer months, but was hampered by surface flow intermittency – surface flow ceased in the vicinity of the device on or near July 16, 2010. Spot temperature measurements ranged from 6.1°C in December to 14.3°C in August, while continuous monitoring data reveal mean daily values ranging from 5.7º to 21.6ºC (Table 5.2.1-1).

<table>
<thead>
<tr>
<th>Stream</th>
<th>Time Period</th>
<th>Minimum Temperature (ºC)</th>
<th>Maximum Temperature (ºC)</th>
<th>Average Temperature (ºC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa Canyon Creek¹</td>
<td>6/17 – 7/14</td>
<td>9.8 (June 20)</td>
<td>21.6 (July 15)</td>
<td>15.8</td>
</tr>
<tr>
<td>Iowa Canyon Creek²</td>
<td>8/25 – 10/28</td>
<td>5.7 (Oct 27)</td>
<td>16.8 (Oct 3)</td>
<td>12.7</td>
</tr>
<tr>
<td>SFAR Upstream of Iowa Canyon Creek</td>
<td>8/27 – 10/28</td>
<td>10.5 (Aug 28)</td>
<td>13.3 (Aug 31)</td>
<td>11.7</td>
</tr>
<tr>
<td>SFAR Downstream of Iowa Canyon Creek</td>
<td>8/27 – 10/28</td>
<td>10.1 (Aug 27)</td>
<td>13.6 (Sep 2)</td>
<td>11.9</td>
</tr>
</tbody>
</table>

1 The original temperature recorder was installed in the lower section of the creek downstream of the last waterfall / cascade approximately 150 m upstream of the confluence with the SFAR.

2 In mid-July, flow in the lower portion of the creek (downstream of the last waterfall / cascade) became subsurface, but was not discovered until late August. Once discovered, the temperature recorder was moved upstream of the last waterfall / cascade where surface flow appeared to be stable.

5.2.1.3 Water Quality

SMUD conducted water quality sampling for metals (as well as other parameters) on November 2, 1992, upstream and downstream of Slab Creek Reservoir. The purpose of this sampling program was to assess the condition of the reservoir following two significant events. The first event was the mobilization of sediment caused by the reduction of reservoir water elevation to lower than typical water elevation levels in 1991. The second event was the Cleveland Fire in summer 1992. This fire, located in the upper watershed of the SFAR, caused a significant increase of sediment and increased turbidity in all waterways downstream of the fire, but particularly in Slab Creek Reservoir. Two sampling stations were used in the sampling program: one at the upstream end of Slab Creek Reservoir by the Forebay Road Bridge and one downstream of Slab Creek Dam. The results of the sampling are presented in Table 5.2.1-2.
### Table 5.2.1-2. Results of water quality sampling for various elements including metals by SMUD upstream and downstream of Slab Creek Reservoir on November 2, 1992.

<table>
<thead>
<tr>
<th>Element</th>
<th>Upstream of Slab Creek Reservoir (µg/l)</th>
<th>Downstream of Slab Creek Dam (µg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Arsenic</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Barium</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Boron</td>
<td>&lt;2</td>
<td>&lt;250</td>
</tr>
<tr>
<td>Cadmium</td>
<td>&lt;1</td>
<td>1</td>
</tr>
<tr>
<td>Calcium</td>
<td>2,808</td>
<td>5,033</td>
</tr>
<tr>
<td>Chromium</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Cobalt</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Copper</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Iron</td>
<td>271</td>
<td>383</td>
</tr>
<tr>
<td>Lead</td>
<td>&lt;5</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Magnesium</td>
<td>497</td>
<td>903</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.85</td>
<td>0.3</td>
</tr>
<tr>
<td>Manganese</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Nickel</td>
<td>&lt;2</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Selenium</td>
<td>7</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Silicon</td>
<td>2,815</td>
<td>4,308</td>
</tr>
<tr>
<td>Silver</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Sodium</td>
<td>1,878</td>
<td>4,727</td>
</tr>
<tr>
<td>Strontium</td>
<td>36</td>
<td>75</td>
</tr>
<tr>
<td>Titanium</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Vanadium</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Zinc</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

### UARP Relicensing Surveys

From 2002 through 2004, SMUD performed water quality studies in support of the relicensing of the UARP and Pacific Gas and Electric Company’s Chili Bar Project. Studies were conducted in the 10 UARP reservoirs, Rockbound Lake and Chili Bar Reservoir, and in river reaches that could be affected by operations of the UARP and Chili Bar Project, as well as many inflowing streams to the reservoirs.

Four sampling periods were targeted to coincide with: (1) spring runoff; (2) summer low flow; (3) fall turnover; and (4) following the first major rain. General water quality was sampled *in situ* using a multi-parameter probe (DO, temp, pH, etc.). Samples for parameters such as nutrients, metals, minerals, and organics were collected by grab sample in areas of well-mixed strata. Fifty-five water quality parameters were evaluated during the study, though not all were analyzed for each sample from every site. SMUD requested the analytical laboratories to obtain the lowest method detection limits (MDL) and reporting limits (RL) practicable for the water quality samples.
One of the SFAR monitoring sites was located below Slab Creek Dam, approximately 250 feet upstream of the confluence with Iowa Canyon Creek. This site was sampled seven times between 2002 and 2004 (DTA 2005b). In general, water quality was high in this reach, with most results well below the reporting limit.

Alkalinity was low, with most readings less than 13 mg/l, indicating a low buffer capacity for changes in pH. Turbidity and total suspended solids were negligible, with mean values of less than 2 Nephelometric Turbidity Units (NTU) and 1.0 mg/l, respectively. Total dissolved constituents, measured as total dissolved solids or individually as calcium, magnesium, potassium, sodium, chloride, and sulfate were also low. Values were generally below reporting limits, with minimal seasonal differences. All organic compounds (oil and grease, MTBE, TPH, and gasoline range organics) were below detection limits.

In general the water was well-oxygenated with dissolved oxygen concentrations greater than 82% saturation and 10.0 mg/l of oxygen with one exception, 4.7 mg/l on September 13, 2004, which was suspiciously low considering the closest sites upstream and downstream were 10.4 and 10.2 mg/L, respectively. The water was very soft with hardness readings ranging from less than <1 mg/l to 13 mg/l. Nutrients were also low.

Total phosphorus and ortho-phosphorus each ranged from a low of less than 0.01 mg/l to a high of 0.011 mg/l for total phosphorus and a high of 0.024 mg/l for ortho-phosphorus. Total Kjeldahl nitrogen ranged from less than 0.13 mg/l to 0.26 mg/l. Nitrate-nitrite ranged from less than 0.006 mg/l to 0.04 mg/l, well below the 1.0- mg/l nitrate standard used to characterize source waters that can stimulate algal growth. Similar to other riverine sites within the SFAR watershed, pH generally ranged from about 6.9 to 7.2, and mineral levels were low. There were no values for total metals concentrations in this reach that exceeded primary or secondary Maximum Containment Levels (MCLs).

All bacteria samples collected by SMUD met the Basin Plan Water Quality Objective for fecal coliform geometric mean and single sample criteria, as well as the SWRCB staff’s proposed water quality objective for E. coli.

In 2004, SMUD collected additional information regarding dissolved metal concentrations for comparison with the California Toxics Rule (CTR) Criterion Continuous Concentrations (CCC) and Criterion Maximum Concentrations (CMC) for Freshwater Aquatic Life. The USEPA (40 CFR § 131.38) defines CMC as an estimate of the highest concentration of a material in the water column to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. In comparison, CCC is an estimate of the highest concentration of a material in the water column to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. Two samples from this site exceeded criteria, one for copper (CCC and CMC), and one for lead (CCC only). Since the relicensing studies were performed, the USEPA has established CCC and CMC values for mercury of 0.77μg/L and 1.4μg/L, respectively, neither of which was exceeded by the 2004 data.
2010 Survey

Water quality surveys conducted in 2010 focused on general in-situ parameters (Table 5.2.1-3). Conductivity in the ¼-mile reach was low, never exceeding 40 µS/cm. The lowest conductivity reading in Iowa Canyon Creek occurred on May 28 (49 µS/cm) and reached a maximum of 60 µS/cm on October 29. Dissolved oxygen concentration in the SFAR was lowest in August (7.5 mg/L) and highest in December (10.2 mg/L). Dissolved oxygen concentration was similar in Iowa Canyon Creek with the lowest value observed in August (7.7 mg/L) and the highest value observed in December (10.6 mg/L).

<table>
<thead>
<tr>
<th>Table 5.2.1-3. Water Quality Conditions Recorded at two SFAR stations and in lower Iowa Canyon Creek during site visits in spring, summer, and fall 2010.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location and Date</td>
</tr>
<tr>
<td>Iowa Canyon Creek¹</td>
</tr>
<tr>
<td>SFAR below Pedestrian Bridge</td>
</tr>
<tr>
<td>SFAR near new powerhouse site</td>
</tr>
<tr>
<td>Iowa Canyon Creek²</td>
</tr>
<tr>
<td>SFAR below Pedestrian Bridge</td>
</tr>
<tr>
<td>SFAR near new powerhouse site</td>
</tr>
<tr>
<td>SFAR below Pedestrian Bridge</td>
</tr>
<tr>
<td>Iowa Canyon Creek²</td>
</tr>
<tr>
<td>SFAR below Pedestrian Bridge</td>
</tr>
<tr>
<td>SFAR near new powerhouse site</td>
</tr>
<tr>
<td>Iowa Canyon Creek²</td>
</tr>
</tbody>
</table>

¹ Sampling performed immediately downstream of last waterfall/cascade, approximately 150 m upstream of confluence with the SFAR.
² Sampling performed immediately upstream of last waterfall/cascade, approximately 200 m above confluence with SFAR because flow downstream of waterfall/cascade was subsurface.
5.2.2 Environmental Effects of the Project

5.2.2.1 Water Quantity

Construction activities associated with the Project and appurtenant facilities will take place within Waters of the State and Waters of the U.S. Iowa Canyon Creek and the SFAR are Waters of the U.S. and Waters of the State. According to the USFWS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979), both waters are upper perennial riverine channels with a rock bottom. The SFAR channel is a Type 3 Water of the U.S. and Iowa Canyon Creek is a Type 5 Water of the U.S. However, as described in Section 5.1.1 (Geology and Geomorphology), the streambed of Iowa Canyon Creek contains remnant materials from the construction of Slab Creek Dam in the 1960s: large concrete slabs and a rock fill material originally placed along the creek and SFAR for roads and equipment laydown.

At the SFAR, SMUD will construct a cofferdam along the south bank of the river to excavate rock in the streambed and lay the foundation of the powerhouse. The extent of cofferdam encroachment into the active stream channel will be limited, thereby allowing for full streamflow volume around and downstream of the construction area. The cofferdam will likely be put in place in the month of August, when minimum release requirements at Slab Creek Dam are 63-70 cfs, and removed before winter storms threaten spill events that could compromise the cofferdam.

Once the cofferdam is removed, the foundation of the new powerhouse and appurtenant facilities will permanently lie in Waters of the U.S. and Waters of the State, although the area permanently affected will be smaller than the area within the cofferdam.

SMUD will also excavate rock to be used for construction purposes and reconfigure the grade, bankline, and orientation of the lowermost segment of Iowa Canyon Creek. This activity will be performed directly in the Waters of the State and the U.S. The details of the reconfiguration will be developed in consultation with the USACE, CDFW, and other resource agencies, with the goal of removing rock fill in the creek to create a permanent surface flow that will facilitate passage and biological connectivity between the creek and SFAR during low flow periods.

The surface area of Waters of the U.S. and the State in the SFAR that will be affected by Project construction activities and permanent structures is summarized in Table 5.2.2-1.
Table 5.2.2-1. Summary of Project activity effects on Waters of the U.S. and Waters of the State associated with New Slab Creek Powerhouse Project.

<table>
<thead>
<tr>
<th>Project Activity</th>
<th>Water Body</th>
<th>Nature of Effect</th>
<th>Waters of the U.S.</th>
<th>Waters of the State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock excavation and powerhouse foundation behind cofferdam</td>
<td>SFAR</td>
<td>Temporary</td>
<td>0.08</td>
<td>0.15</td>
</tr>
<tr>
<td>Powerhouse and appurtenant facilities construction</td>
<td>SFAR</td>
<td>Permanent</td>
<td>0.05</td>
<td>0.11</td>
</tr>
</tbody>
</table>

The reconfiguration of the mouth of Iowa Canyon Creek, while occurring in the waters of the U.S. and State, is expected to result in a long-term increase in the acreage of both. The lower approximately 200 feet of Iowa Canyon Creek between the SFAR and the existing bridge across the creek is inset below a fan surface formed of rock fill from previous UARP construction activities (Appendix A, Photo 12). The incised stream course in this segment of the creek constricts the Waters of the U.S. and State. By excavating fill material as part of the reconfiguration plan, Iowa Canyon Creek will be returned to its historic grade, bankline and orientation. The lower segment of the stream will be widened, forming a delta that will be broader than the current delta (Figure 5.2.2-1). This broadening is expected to increase the Waters of the U.S. and State within Iowa Canyon Creek. The expansion of jurisdictional waters in Iowa Canyon Creek will likely offset the permanent losses identified in Table 5.2.2-1.

SMUD will monitor water quality (in situ and water chemistry) in the ¼-mile reach in accordance with the temperature monitoring program associated with the new UARP license.
Figure 5.2.2-1: Preliminary expansion of jurisdictional waters and wetlands in Iowa Canyon Creek.
Once the Project is operational, hydrology in the 8.0-mile SFAR bypass reach from Slab Creek Dam to White Rock Powerhouse will be unchanged except in the ¼-mile reach. Releases from the dam into the ¼-mile reach will be reduced from the seasonally changing values of 63 to 415 cfs to a range of values between 15 and 36 cfs. Whitewater boating releases of 850 to 1,500 cfs, which will initially be provided under the new license by spilling water over the dam, will be reduced in the ¼-mile reach to approximately 250 cfs. During whitewater boating events, the valve at Slab Creek Dam will be fully opened, which, with a water elevation in Slab Creek Reservoir of 1,840 feet, will generate an approximate 250 cfs release. This flow is designed to aid boaters accessing the river at the proposed whitewater boating put-in because the full volume of the target boating flow, between 850 and 1,500 cfs, will be achieved at the downstream end of the ¼-mile reach once water released from the new powerhouse and valve vault adjacent is added to the existing development.

5.2.2.2 Water Temperature

Water temperature in the ¼-mile reach will be largely unaltered by the Project. Because of the limited influence of ambient conditions and water volume within the ¼-mile reach of river, water temperatures are expected to fall generally within the seasonally changing values observed during the relicensing surveys. This assessment is based on the results of water temperature modeling, using the Stream Segment Temperature model (SSTEMP) performed in the ¼-mile reach (Stillwater Sciences 2012a).

Model results show water temperatures in the SFAR at 0.25 miles downstream of Slab Creek Dam are warmest during the month of July under most flow and meteorological conditions (Table 5.2.2-2). Water temperatures decrease with increasing discharge, and are warmest under the more extreme (10% exceedance) model scenario (Table 5.2.2-2).

<table>
<thead>
<tr>
<th>Model Scenario</th>
<th>Release Temperature (°C)</th>
<th>Temperature (°C) at 0.25 miles downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10 cfs</td>
</tr>
<tr>
<td>April – normal</td>
<td>8.28</td>
<td>8.88</td>
</tr>
<tr>
<td>April – hot</td>
<td>8.28</td>
<td>9.29</td>
</tr>
<tr>
<td>May – normal</td>
<td>9.50</td>
<td>10.02</td>
</tr>
<tr>
<td>May – hot</td>
<td>9.50</td>
<td>10.52</td>
</tr>
<tr>
<td>August – normal</td>
<td>11.28</td>
<td>12.21</td>
</tr>
<tr>
<td>August – hot</td>
<td>11.28</td>
<td>12.46</td>
</tr>
<tr>
<td>September – normal</td>
<td>10.39</td>
<td>10.93</td>
</tr>
<tr>
<td>September – hot</td>
<td>10.39</td>
<td>11.16</td>
</tr>
</tbody>
</table>

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Release water temperature is highest during July (Table 5.2.2-2 and Table 5.2.2-3). The maximum increase in downstream water temperature relative to release temperature also occurs during July, with the largest incremental change at the lowest discharge and the smallest change at the highest discharge (Table 5.2.2-3).

<table>
<thead>
<tr>
<th>Model Scenario</th>
<th>Release Temperature (°C)</th>
<th>Change in temperature (°C) at 0.25 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10 cfs</td>
</tr>
<tr>
<td>April – normal</td>
<td>8.28</td>
<td>0.60</td>
</tr>
<tr>
<td>April – hot</td>
<td>8.28</td>
<td>1.01</td>
</tr>
<tr>
<td>May – normal</td>
<td>9.50</td>
<td>0.52</td>
</tr>
<tr>
<td>May – hot</td>
<td>9.50</td>
<td>1.02</td>
</tr>
<tr>
<td>June – normal</td>
<td>12.94</td>
<td>0.69</td>
</tr>
<tr>
<td>June – hot</td>
<td>12.94</td>
<td>1.13</td>
</tr>
<tr>
<td>July – normal</td>
<td>13.72</td>
<td>0.89</td>
</tr>
<tr>
<td>July – hot</td>
<td>13.72</td>
<td>1.56</td>
</tr>
<tr>
<td>August – normal</td>
<td>11.28</td>
<td>0.93</td>
</tr>
<tr>
<td>August – hot</td>
<td>11.28</td>
<td>1.18</td>
</tr>
<tr>
<td>September – normal</td>
<td>10.39</td>
<td>0.54</td>
</tr>
<tr>
<td>September – hot</td>
<td>10.39</td>
<td>0.77</td>
</tr>
</tbody>
</table>

The SSTEMP model as applied to the upper ¼-mile reach of the SFAR below the Slab Creek Dam was used as a means to investigate relative increases in water temperature under varying flow and meteorological conditions. The maximum increase in downstream water temperatures relative to release temperatures was 1.56°C, and occurs with the lowest modeled flow release of 10 cfs, in the hottest month (July), under “hot” climate conditions. For comparison, the corresponding increase with a release of 20 cfs under these same conditions was 0.86°C. Even under this “worst case” scenario, stream temperatures are below 15.4°C, which would generally be considered in the optimal range for resident salmonids.

5.2.2.3 Water Quality

Construction of the Project could potentially result in temporary adverse effects on water quality and related resources. Mechanisms by which this could occur include erosion on disturbed lands along Iowa Canyon Creek and the SFAR, suspending river sediments within instream work zones, and introducing substances used during construction such as fuel, oil, and concrete during stormwater runoff events. The risk of these events adversely affecting water quality will be limited through implementation of best management practices (BMPs) including, erosion control measures, eliminating in-water work, managing stormwater runoff, and restricting areas where equipment is maintained, fueled, and used for construction purposes.

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One source of potential erosion and sedimentation is rock excavation that will occur in upland areas along Iowa Canyon Creek and the SFAR shoreline. Excavation is necessary to create a foundation for the Project facilities, such as the powerhouse and valve vault. Additional upland ground disturbing activities will also occur as SMUD prepares the construction site for material lay-down, locating a temporary construction office, parking, and access to the jobsite. This may include temporary lay-down of the imported fill material that will be used to create the powerhouse yard. Before any activities are undertaken at the site, SMUD will develop an Erosion and Sedimentation Control Plan, as described in Section 5.1.2. This plan will be developed in concert with a Storm Water Pollution Prevention Plan (SWPPP) that protects water quality by managing hazardous substances during construction activities. Both plans will be prepared by a Qualified SWPPP Developer (QSD), in consultation with state and federal resource agencies. SMUD will submit the plan to FERC no later than 90 days before initiating ground disturbing activities. The two plans will be implemented by a Qualified SWPPP Practitioner (QSP), who will also evaluate the adequacy and effectiveness of the erosion control measures throughout Project construction activities.

At the conclusion of construction activities, SMUD will implement further BMPs at the Project site. Temporary use areas, earth embankments, and minor cut and fill areas will be re-vegetated in and around the powerhouse construction site. It is anticipated that a native grass and/or forb seed mix combined with seeds of other shallow-rooted woody or perennial vegetation would be applied to the land, likely in combination with erosion control matting and/or hydroseeding for interim erosion control.

A temporary cofferdam along the left shoreline of the SFAR will be installed to allow excavation to proceed in a dry work area. All water flow in the SFAR will pass around the cofferdam, allowing for full streamflow volume downstream of the construction area. Clear water accumulating within the dewatered zone will be pumped into the river. Turbid water accumulating in the dewatered zone will be pumped into a settling pool located in the construction site where suspended sediment will be allowed to settle out before the water is returned to the SFAR.

Some excavation will be performed within the CDFW Waters of the State and the USACE Waters of the U.S (see Section 5.2.2.1). To eliminate in-water excavation, SMUD will construct a cofferdam so the excavation proceeds in a dry work area. Clear water pooling within the dewatered zone will be pumped into the river. Turbid water will be pumped into a settling pool located in the construction site where suspended sediment will be allowed to settle out before the water is returned to the SFAR. Any equipment used during rock excavation within Waters of the State or U.S. will be checked and maintained on a daily basis to ensure there is no leakage of gasoline, oil, or grease into the work area. Equipment and vehicle refueling and lubrication will be performed outside of the Waters of the State and U.S. in enclosed upland area where SMUD would capture any incidental spill materials.
At the conclusion of construction activities, SMUD will implement further measures to minimize erosion at the Project site. Temporary use areas, earth embankments, and minor cut and fill areas will be re-vegetated in and around the powerhouse construction site. It is anticipated that a native grass and/or forb seed mix combined with seeds of other shallow-rooted woody or perennial vegetation would be applied to the land, likely in combination with erosion control matting and/or hydrosed for interim erosion control. SMUD will also ensure that no construction debris is left on the construction site or in the Waters of the U.S. or State at the conclusion of construction activities.

The above measures will be included in a Construction Plan SMUD will prepare for the Project. The plan will include a detailed description of all BMPs to be followed by the construction contractor. This plan will incorporate all requirements of federal and state resource agencies as identified in the Clean Water Act 401 Water Quality Certificate, Clean Water Act 404 Permit, and Streambed Alteration Agreement with the State of California, Department of Fish and Wildlife.

SMUD will monitor water temperature and water quality in the ¼-mile reach in accordance with the temperature monitoring program associated with the new UARP license.

Because the Project will affect Waters of the United States, SMUD reviewed the Floodplain Hazard and Analysis Evaluation BMP of the U.S. Forest Service Region 5 (USFS R5 2011). Floodplains are land areas of unconsolidated sediments that lie adjacent to rivers that are subject to recurring inundation. The objective of the BMP is to avoid long-term and short-term water quality impacts resulting from modification of or construction within a floodplain. Because the Project will be constructed within the floodplain of the SFAR, the potential exists for the creation of flood hazards and the release of toxic substances if the powerhouse were damaged by flood waters. However, the probability of their event is very small. First, the flood hazard in the SFAR, in terms of area of unconsolidated sediments or level of human habitation, is minimal to non-existent. River morphology at the Project site is characteristic of mid-elevation Sierra Nevada rivers – a deeply incised canyon with stable bedrock and boulder dominated streambed. Broad alluvial areas of unconsolidated sediments are not present. Furthermore, man-made structures are absent from the floodplain at the Project site and for miles downstream. Thus, construction of the new powerhouse will not alter flood volume or the existing low flood hazard at the Project site or downstream. Secondly, the probability of a flood damaging the powerhouse has been minimized by its design. Like the UARP Camino Powerhouse, the powerhouse roof elevation has been designed to sustain a 100-year flood, thereby minimizing the potential for flood waters to damage the powerhouse and release toxic substances into the river (Tetra Tech 2011).
5.3 Aquatic Resources

5.3.1 Affected Environment

5.3.1.1 Benthic Macroinvertebrate

During the UARP relicensing process, benthic macroinvertebrate (BMI) samples were collected in the general vicinity of the proposed New Slab Creek Powerhouse Project as a component study focusing on all river reaches affected by the UARP (DTA and Stillwater Sciences 2005a). Initially performed in 2002 then repeated in 2003, BMI sampling followed the procedures outlined in the California Stream Bioassessment Procedure (CSBP) (Harrington and Born 1999). A sampling section was located directly adjacent to and downstream of the Project. As specified in the CSBP, five riffle habitat units were identified within the site and three were randomly chosen for sampling. Samples collected by kicknet in each of the three sampling riffles were combined into a single composite sample for the site. Additionally, habitat value assessments were performed following the CSBP.

Over the two-year period, the habitat value of the site ranged from 126 to 168 units. These scores are considered suboptimal to optimal habitat, which indicates suitable habitat for the BMI community. The composite metric scores for the site were consistently above average compared to a reference site on the SFAR above Slab Creek Reservoir. Taxonomic richness was high and stable in both years, ranging from a mean of 39 taxa in 2002 to a mean of 40 taxa in 2003. The mean EPT taxa richness was high and ranged from 21 taxa in 2002 to 19 taxa in 2003. The mean tolerance value remained stable between the two years, ranging from 4.4 in 2003 to 4.7 in 2004. The percent intolerant organisms present indicate that water quality was high at the site. In 2002, intolerant taxa accounted for 21 percent of the total taxa. In 2003, intolerant taxa accounted for 20 percent of the total. Taken as a whole, these metrics indicate non-impairment conditions at the site.

During the summer of 2010 BMI sampling surveys were conducted in support of the proposed Project (ECORP 2011a) using the California Water Resources Control Board’s “Surface Water Ambient Monitoring Program” (SWAMP) BMI sampling protocol (Ode 2007). These reach-wide methods, also known as “multi-habitat” (MH) collection methods, were used to obtain BMI samples in the SFAR. The CSBP targeted-riffle protocol was used for sample collections in lower Iowa Canyon Creek due to stream geomorphology in the lower reaches.

BMI sampling and habitat assessment surveys were conducted at two locations within the ¼-mile reach: Site 1, located immediately upstream of the mouth of Iowa Canyon Creek; and Site 2, located immediately downstream of the mouth of Iowa Canyon Creek. A third site was located in Iowa Canyon Creek approximately 1,000 feet upstream from the confluence with the SFAR. The SFAR sites were generally in the same location as Site SC-11 from the UARP relicensing studies.
The objective of this study was to assess conditions and document the current BMI community present in wadable habitats in the vicinity of Slab Creek Dam, and calculate Indices of Biological Integrity (IBI) (Rehn 2010) and Multi-Metric Indices (MMI) (Rehn et al. 2008) scores for each site. These indices were developed to describe and evaluate BMI community response to effects of hydroelectric projects, and to assist in evaluating general stream conditions, each utilizing a different set of metrics. IBI scores are grouped into five categories: 0-19 = ‘Very Poor’; 20-39 = ‘Poor’; 40-59 = ‘Fair’; 60-79 = ‘Good’; and 80-100 = ‘Very Good’ (Harrington et al. 2010). MMI scale values are grouped into three categories: 0-32 = “Poor”; 33-66 = “Fair”; and 67-100 = “Good” (Rehn et al. 2008).

The results of the metric analyses for the two biological indices for the SFAR sites and for the Iowa Canyon Creek site are summarized in Table 5.3.1-1. Based on the BMI metrics and the calculated IBI and MMI scores for the ¼-mile reach, the benthic community is considered to be in ‘Fair’ condition. Site 2 was generally deeper than Site 1 with average depths of 0.6 to 1.0 m compared to average depths of 0.4 to 0.9 m for Site 1. Overall, the substrate composition, which was dominated by boulders, was similar at both sites.

Due to differences in habitats sampled and methodologies used to collect the samples, results of the targeted riffle sampling under the CSBP cannot be directly compared with multi-habitat sampling results from the SWAMP protocol. However, since the IBI and MMI multi-metric indices were developed utilizing both targeted riffle and multi-habitat approaches, the CSBP methodology provides data that can be generally compared with the SWAMP results. Based on the BMI metrics and the calculated IBI score of 73 for the Iowa Canyon Creek site, the benthic community is considered to be in ‘Good’ condition. The MMI score of 88 for the Iowa Canyon Creek site also indicated that the stream was in ‘Good’ condition.

<table>
<thead>
<tr>
<th>Site</th>
<th>IBI</th>
<th>MMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1</td>
<td>44 (Fair)</td>
<td>44 (Fair)</td>
</tr>
<tr>
<td>Site 2</td>
<td>51 (Fair)</td>
<td>50 (Fair)</td>
</tr>
<tr>
<td>Iowa Canyon Creek*</td>
<td>73 (Good)</td>
<td>88 (Good)</td>
</tr>
</tbody>
</table>

* Due to stream geomorphology and limited site lengths available in the lower portion of the creek, IBI and MMI values for Iowa Canyon Creek were calculated based on data collected using the CSBP targeted riffle procedure instead of the SWAMP multi-habitat approach.

Results of the 2010 surveys conducted within the ¼-mile reach were generally similar to the results of BMI surveys conducted within the same reach in 2002 and 2003. Table 5.3.1-2 provides a comparison of the 17 metrics obtained at Site SC-11 during the 2002 and 2003 surveys with the same metrics obtained at the SFAR sites 1 and 2 in 2010. Taxa Richness was higher in 2010 than in 2002-2003, due primarily to the lower level of taxonomic identification associated with the SWAMP protocol (Level II taxonomy)

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relative to the Level I identification required by the CSBP. If the Chironomidae collected during the 2010 surveys are reduced to the Tribe identification level used for the 2002 and 2003 data, Taxa Richness values are similar.

The Shannon Diversity Index (SDI) was similar for the 2002-2003 and 2010 sampling efforts; although, the SDI in 2010 at Site 1 site was higher than either of the values obtained in 2002 or 2003. Additionally, the EPT Index and Sensitive EPT Index at the ¼-mile reach downstream of Slab Creek Dam sites in 2010 were much lower than that observed in 2002 and 2003. Tolerance Value at Site 1 in 2010 was slightly higher than the 2002 and 2003 results, although the Site 2 value was similar to the 2003 results. Percent Intolerant Organisms were similar among all years; however, the values for Percent Tolerant Organisms were lower in 2010 than during the 2002 and 2003 sampling efforts. Overall, the benthic communities at sites 1 and 2 are generally similar to that observed during the 2002 and 2003 surveys.

Based on the IBI and MMI scores, the sampling sites within the ¼-mile reach are considered to be in “fair” condition. Several aquatic habitat characteristics present within the reach are likely the primary factors affecting the composition of the benthic community. These factors include the general lack of low-gradient riffle habitat; available substrates consisting primarily of boulder and bedrock; the presence of the invasive alga *(Didymosphenia geminata [Didymo]*) that covered most of the larger substrates within the ¼-mile reach; and other factors associated with the close proximity to Slab Creek Dam.

### Table 5.3.1-2. Comparison of Slab Creek ¼-mile reach downstream of Slab Creek Dam 2010 Benthic Macroinvertebrate results with Data Collected Downstream of Iowa Canyon Creek in 2002 and 2003 as part of the UARP Relicensing Studies.

<table>
<thead>
<tr>
<th>BMI Metrics Survey</th>
<th>Survey Sites and Sampling Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SC-11 Fall 2002*</td>
</tr>
<tr>
<td>Estimated Abundance</td>
<td>1200</td>
</tr>
<tr>
<td>Taxa Richness</td>
<td>39</td>
</tr>
<tr>
<td>Percent Dominant Taxon</td>
<td>18.0</td>
</tr>
<tr>
<td>EPT Taxa</td>
<td>21</td>
</tr>
<tr>
<td>EPT Index (%)</td>
<td>57.0</td>
</tr>
<tr>
<td>Sensitive EPT Index</td>
<td>23.0</td>
</tr>
<tr>
<td>Ephemeroptera Taxa</td>
<td>6.7</td>
</tr>
<tr>
<td>Plecoptera Taxa</td>
<td>7.7</td>
</tr>
<tr>
<td>Trichoptera Taxa</td>
<td>6.3</td>
</tr>
<tr>
<td>Shannon Diversity Index</td>
<td>2.9</td>
</tr>
</tbody>
</table>

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The influence of Didymo on the BMI community is revealed by comparing the community observed in 2002-2003, when Didymo was not noticeably present, to the community in 2010. Most notably there appears to be a substantial increase in the proportion of Diptera, particularly Chironomidae, over time. During the 2002-2003 period, chironomids numerically ranged from about 11 to 25 percent of the benthic community. In 2010, this percentage appears to have increased several-fold to 54 to 76 percent. Similarly, the EPT taxa have apparently declined from about 41 to 66 percent of the total community abundance in 2002-2003 to about 15-28 percent in 2010. The number of worms may also have increased from 2002-2003 to 2010. These results are consistent with the bulk of the scientific literature which demonstrates that when Didymo becomes abundant, there is a community shift away from the larger EPT taxa to the smaller chironomids and oligochaetes (AECOM 2012). The data for Iowa Canyon Creek, a stream that does not presently contain Didymo, supports this hypothesis. Iowa Canyon Creek has a more classically structured benthic macroinvertebrate community typical of a healthy trout stream. There is an abundance of EPT taxa with a small chironomid component with a high level of species richness.

Factors other than the presence of Didymo may have contributed to the shift away from EPT taxa to chironomids and oligochaetes. For example, the reduction in EPT taxa numbers may be due to inherent inter-annual fluctuations in population levels of these taxa or the result of spill events at Slab Creek Dam. In June 2010, a 12-day spill event reaching 4,000 cfs may have dislodged EPT index causing the reduced numbers of taxa observed in September of that same year. No spill events occurred in 2002, but similar spills occurred in 2003.

---

**Table 5.3.1-2. Comparison of Slab Creek ¼-mile reach downstream of Slab Creek Dam 2010 Benthic Macroinvertebrate results with Data Collected Downstream of Iowa Canyon Creek in 2002 and 2003 as part of the UARP Relicensing Studies.**

<table>
<thead>
<tr>
<th>BMI Metrics</th>
<th>Survey Sites and Sampling Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SC-11 Fall 2002*</td>
</tr>
<tr>
<td>Tolerance Value</td>
<td>4.4</td>
</tr>
<tr>
<td>Percent Intolerant (0)</td>
<td>21.0</td>
</tr>
<tr>
<td>Percent Tolerant (8)</td>
<td>8.8</td>
</tr>
<tr>
<td>Percent Collector-gatherers</td>
<td>55.0</td>
</tr>
<tr>
<td>Percent Collector-filterers</td>
<td>15.0</td>
</tr>
<tr>
<td>Percent Scrapers</td>
<td>7.0</td>
</tr>
<tr>
<td>Percent Predators</td>
<td>8.3</td>
</tr>
<tr>
<td>Percent Shredders</td>
<td>7.3</td>
</tr>
</tbody>
</table>

* Midge identified to Tribe only.

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The influence of Didymo on the BMI community is revealed by comparing the community observed in 2002-2003, when Didymo was not noticeably present, to the community in 2010. Most notably there appears to be a substantial increase in the proportion of Diptera, particularly Chironomidae, over time. During the 2002-2003 period, chironomids numerically ranged from about 11 to 25 percent of the benthic community. In 2010, this percentage appears to have increased several-fold to 54 to 76 percent. Similarly, the EPT taxa have apparently declined from about 41 to 66 percent of the total community abundance in 2002-2003 to about 15-28 percent in 2010. The number of worms may also have increased from 2002-2003 to 2010. These results are consistent with the bulk of the scientific literature which demonstrates that when Didymo becomes abundant, there is a community shift away from the larger EPT taxa to the smaller chironomids and oligochaetes (AECOM 2012). The data for Iowa Canyon Creek, a stream that does not presently contain Didymo, supports this hypothesis. Iowa Canyon Creek has a more classically structured benthic macroinvertebrate community typical of a healthy trout stream. There is an abundance of EPT taxa with a small chironomid component with a high level of species richness.

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Regardless of the underlying reasons for the observed shift in species composition in the study reach, the benthic community continues to support a wide range of functional feeding groups and taxa with a wide range in tolerance values (Table 5.3.1-2). Tolerance values over time continue to range from 0 to 9, with the majority of the taxa ranging from 4 to 6. Essentially the reach supports a functioning benthic community, just different from the community that existed in 2002/2003, prior to the proliferation of Didymo.

5.3.1.2 Fish

Prior to 2010, no fish population surveys had been performed in Iowa Canyon Creek or the ¼-mile reach. However, surveys were conducted in the lower portion of the 8.0-mile Slab Creek Dam Reach during UARP relicensing that provide useful context to habitat conditions and fish populations in the ¼-mile reach. Between 2002 and 2004, a variety of electrofishing efforts, snorkeling surveys, and multi-station longitudinal investigations were conducted between White Rock Powerhouse and just above mid-reach (DTA and Stillwater Sciences 2005b). In 2007, a second and more extensive longitudinal investigation in the lower 5.3 miles of the river was performed.

The findings of the various surveys between 2002 and 2007 revealed the presence of an intact native fishery reflected in a progressive transition of fish species from a diverse warmwater assemblage in the bottom of the Slab Creek Dam Reach, near White Rock Powerhouses, to a coldwater assemblage (predominately trout) in the upper portion of the reach. Rainbow trout (Oncorhynchus mykiss) were the numerically dominant species in the upper portion of the reach, whereas downstream native transition zone species such as hardhead (Mylopharodon conocephalus) and Sacramento sucker (Catostomus occidentalis) made up a larger percentage of the fish community. Exotic species, including brown trout (Salmo trutta), green sunfish (Lepomis cyanellus), and smallmouth bass (Micropterus dolomieu) were also found within the downstream portion of the reach.

The dominance of coldwater species in the upper portion of the reach was confirmed by the project-specific studies performed in 2010. During August and September of 2010, fish community sampling was performed within the ¼-mile reach using two methodologies: backpack electrofishing and direct observation (snorkel survey). In addition, qualitative electrofishing was performed within Iowa Canyon Creek at a site approximately 1,900 feet upstream of the confluence and above a cascade/waterfall complex.

The electrofishing and snorkel surveys combined indicate that the fish community currently present within the ¼-mile reach is lower in diversity compared to downstream reaches of the SFAR. Three fish species were documented within the ¼-mile reach during the electrofishing surveys: rainbow trout, brown trout, and Sacramento sucker, with rainbow trout being the most abundant. The rainbow trout population in the reach displayed a weak age class structure, with early age classes poorly represented. The
biomass for all rainbow trout for both SFAR sampling sites combined was 897.2g/100m. Biomass for all brown trout in these sites was 1,438.6g/100m. These population levels may be lower than actual levels given the low capture efficiencies reported by the field staff performing the electrofishing work. Nevertheless, the presence of multi-year age classes for both rainbow and brown trout indicates the existence of self-sustaining populations of both species, although spawning may not be supported in reach, as discussed below.

The condition factors of resident trout in the ¼-mile reach are generally close to 1.0, which is comparable to previous sampling data. Values in this range are typical of Sierran streams of similar size and comparable to observations during relicensing studies. The typical mean condition factors for wild trout in western Sierran streams range from approximately 0.80 to 1.20; although condition is dependent on the time of sampling, the species, and strain of trout (Beak 1991, EA 1986, Ebasco Environmental 1993, Wilcox 1994).

Fish habitat in the ¼-mile reach is limited by the close proximity of Slab Creek Dam. The dam influences structural conditions, food production, and spawning habitat in the reach. The morphology of the SFAR in the ¼-mile reach is controlled by the dominance of bedrock in the bed and banks of the channel. This characteristic, combined with the presence of large colluvially derived boulders and angular rock-waste from 1960s dam construction have created a morphology of very large and stable, energy-dissipating structures. Lacking recruitment of alluvial material from upstream sources, the resultant morphology of the ¼-mile reach is a static assortment of high-gradient riffles and pools dominated by large boulders, which represent 67% of the substrate. Of limited distribution in the reach are low-gradient riffles with gravel and cobble substrate — areas that generally serve as the primary food-producing habitats of coldwater trout streams. The limited food availability in the reach is worsened by a lack of insect drift from upstream sources due to the close proximity of the dam, and a likely low allochthonous input from the sparse riparian vegetation throughout the reach.

The same morphological conditions described above that limit food production in the ¼-mile reach also limit spawning and rearing habitat. The small percent of gravel and fines (4.1%) present in the reach likely limit trout spawning. This is particularly true upriver of the confluence with Iowa Canyon Creek, which is the first tributary stream entering the SFAR downstream of Slab Creek Dam. With no replenishment of gravels from upstream sources, nearly all gravel that enters the system upstream of Iowa Canyon Creek is eventually washed out of the ¼-mile reach during spill events. Thus, the limited spawning that does occur is restricted to the lower segment of the ¼-mile reach where Iowa Canyon Creek alluvial inputs provide spawning-size gravel in SFAR. Rearing habitat for juvenile rainbow trout is also limited in a river dominated by bedrock and boulder. Traditional habitat for juvenile trout consists of shallow and slow stream margins where small substrate particles and emergent vegetation provide ample cover — factors in low supply in the ¼-mile reach.
The presence of the invasive alga Didymo is also potentially contributing to the issue of limited food availability. This algal species was observed in 2010 covering larger substrates (especially large cobble, boulder and bedrock substrate) within most of the ¼-mile reach with a thick vegetative layer. Smaller substrates throughout the reach, such as small cobble and gravel that predominantly exist downstream of Iowa Canyon Creek, generally had very little attached Didymo. While the fish community is largely constrained by the physical characteristics of the local environment, the presence of Didymo may actually be a benefit over the situation in its absence. In the absence of Didymo, the periphyton community was not as visually apparent during investigations in 2002-2003. Currently, Didymo is abundant and easily observed visually. Didymo mats have a greater biomass than would occur in its absence and they provide habitat for a benthic community dominated by chironomids, a group that contributes substantially to insect drift. Drift, in turn, provides a food supply for fish present downstream of the dam. It is hypothesized that the abundance of Didymo in the study reach has increased the insect drift available to fish over drift conditions that occurred prior to its proliferation. In this sense, Didymo may actually benefit the fish community in the study reach by providing an enhanced food resource in a stream reach that is not expected to be very productive.

Whether Didymo actually increases the insect drift in the ¼-mile reach is uncertain. However, a review of the scientific literature strongly suggests Didymo would not be expected to adversely affect the fish community of the study reach in any direct, indirect, or cumulative way (AECOM 2012). This hypothesis is similar to the risk assessment completed for New Zealand rivers (Biosecurity New Zealand 2012). In that assessment it was determined that, while there was some uncertainty, the environmental impact potential of Didymo was rated as “low”. Recent assessments have also observed that no impacts on juvenile or adult salmonid species in North America or Europe have been reported (CNPS 2010).

The lowermost 3,000 feet of Iowa Canyon Creek is separated into two sections by a distinct waterfall-cascade complex, which is located approximately 500 feet upstream of the confluence with the SFAR. Upstream of the complex, Iowa Canyon Creek is a perennial stream of moderately high gradient passing under a closed canopy of alder and willow riparian vegetation. Qualitative electrofishing performed in this section during 2010 revealed a viable, self-sustaining population of rainbow trout, represented by multiple age classes (ECORP 2011b). Downstream of the complex, within the 450-feet segment where the new bridge will be constructed, the creek is seasonally intermittent, as discussed in Section 5.1.1. This flow intermittency in the lower 450 feet of Iowa Canyon Creek precludes establishment of a self-sustaining population below the complex and stops downstream migrants from entering the SFAR in summer and fall months.
5.3.1.3 Amphibian and Aquatic Reptiles

Foothill yellow-legged frog (*Rana boylii*) (FYLF) and western pond turtle (*Actinemys marmorata*) (WPT) surveys on the SFAR below Slab Creek Reservoir were conducted from 2002 through 2004 as part of the relicensing process for SMUD’s UARP and PG&E’s Chili Bar Project (DTA and Stillwater Sciences 2005c). Within the Slab Creek Dam Reach (from the base of Slab Creek Dam downstream to White Rock Powerhouse), FYLF and WPT surveys were conducted at five river sites and two tributary sites. Two of these sites were located within the ¼-mile reach: Site SC-2A, the SFAR immediately downstream of Slab Creek Dam; and Site SC-2B, Iowa Canyon Creek in the vicinity of the confluence with the SFAR. These same two sites were surveyed during the 2010 FYLF (and WPT) VES; although the Iowa Canyon Creek site in 2010 was extended upstream to the point where Slab Creek Reservoir Road crosses the creek, approximately 1800 feet upstream of the confluence with the SFAR. As during the previous surveys, FYLF were not observed at these sites (ECORP 2011c).

Results of surveys conducted within this reach during the study period did not document the presence of either FYLF or WPT at any of the SFAR or tributary sites. However, bullfrog tadpoles, juveniles, and adults were observed at several sites in the lower SFAR below Rock Creek. Even though FYLF and WPT were not observed within the reach during the relicensing studies, both species were incidentally observed by USFS biologists. In 2003, an adult FYLF was observed on the SFAR approximately 0.5 miles upstream of White Rock Powerhouse by Jann Williams (USFS); and three juvenile WPT were observed on the SFAR within the lower portion of the reach by Jann Williams and Jens Hamar (USFS). Subsequent efforts failed to produce any additional FYLF observations in this reach.

In 2010 FYLF and WPT surveys were conducted in the lower portion of Iowa Canyon Creek and the ¼-mile reach as part of the proposed Project. The FYLF VES and habitat assessment methods followed the same protocols used for the UARP relicensing studies, and for most hydroelectric projects in the Sierra Nevada (Seltchenrich and Pool 2002). This standardized approach specifies the timing of surveys for different life stages, parameters to be measured, and the exact methods to be employed. It also includes a summary of life history and habitat information for FYLF. A total of three surveys were conducted in each survey reach: one during early summer for FYLF egg masses and/or tadpoles, one in mid-summer for tadpoles and WPT, and one in the early fall for post-metamorphic frogs and WPT. As during the previous surveys, FYLF were not observed at these sites.

Even though potentially suitable structural habitat for FYLF was present within the survey reach, spring and summer water temperatures are too low to support successful breeding by this species. Some potentially suitable habitat is present for WPT; however, basking areas are limited and water temperatures may also be too cold for
this species. Periodic water temperature data collected from June through September within the ¼-mile reach indicate that water temperatures were generally between 11.0 and 15.0°C (52 and 59°F) during this period.

Considering the habitat characteristics and environmental conditions documented in the ¼-mile reach and in Iowa Canyon Creek during the 2010 surveys, neither of these sites appears to provide suitable FYLF breeding or larval development habitat, and the SFAR also generally lacks habitat for juveniles and adults. FYLF have not been documented within the Slab Creek Dam Reach and based on available information, there have only been a few historical sightings of FYLF within the UARP reaches of the SFAR. These sightings were restricted to three general locations on the SFAR; 0.4-mile upstream of Slab Creek Reservoir (1994), upstream of Camino Powerhouse, and the river both upstream and downstream of the mouth of Silver Creek, a tributary to the SFAR: and to several locations on lower Silver Creek (DTA and Stillwater Sciences 2005c). Since river habitat and spring and summer river conditions (cold water temperatures) within the ¼-mile reach are not suitable for, either breeding or larval development, and only marginal juvenile and adult habitat is present, it is not surprising that FYLF have not been observed.

5.3.2 Environmental Effects of the Project

5.3.2.1 Benthic Macroinvertebrates

Construction and operation of the Project has the potential to adversely affect BMI populations. These effects include sedimentation of the SFAR and Iowa Canyon Creek during construction as well as habitat reductions in the ¼-mile reach. With respect to streambed sedimentation, SMUD will minimize the deleterious effects on BMI by adhering to BMPs during construction, as described in Section 5.2.2.

The proposed 15-36 cfs release schedule from Slab Creek Dam will reduce the ¼-mile reach wetted riverbed area below levels that exist under the new license minimum release requirements (Tetra Tech 2011). For example, the new license minimum release requirements create a fairly stable wetted area during the 8-month period of July through February (Table 5.3.2-1). During this period flow levels range between 63 and 90 cfs, depending on water year type. A flow of 63 cfs corresponds to a wetted area in the reach of approximately 120,900 ft² compared to 107,000 ft² under 15 cfs. Thus, the 15-36 cfs release will reduce the wetted area of the ¼-mile reach that is suitable for BMI colonization throughout the year by approximately 10%.
A 10 percent reduction in wetted area may have a deleterious effect on the BMI community (Rehn 2010). However, the ‘Fair’ condition of the 2010 BMI community, which was assessed under a constant flow regime of 36 cfs, plus periodic spill events, may not change under the proposed flow regime as several limiting factors in the ¼-mile reach unrelated to streamflow may continue to dominate the BMI potential in the reach. Rehn (2010), for example, found when comparing reference sites to sites directly downstream of dams, decreased index of biotic integrity scores below dams were related to lower habitat variability and substrate coarsening. Other factors generally associated with conditions immediately downstream of a dam include a suppressed thermal regime and lack of allochthonous organic matter from upstream sources.

BMI communities are generally more diverse in riffle habitats, which often provide more surface area and microhabitat heterogeneity than other habitat types, such as bedrock runs or pools. Studies performed during UARP relicensing demonstrated a relationship between larger substrate composition (boulder and bedrock) and lower BMI assemblages (DTA and Stillwater Sciences 2005a). Thus, the ‘Fair’ condition of the BMI may be partially explained by the finding that riffle habitat (especially low-gradient riffles) accounts for only 9.5% of all habitat types within the ¼-mile reach. Furthermore, the limited riffle habitat that does exist in the ¼-mile reach is comprised of primarily boulder/bedrock substrate, with only scattered cobble and gravel. These substrate features, basically representing a bedrock base with a thin veneer of alluvium, do not provide a high level of microhabitat heterogeneity as compared to cobble/rubble dominated riffles, and further support the likelihood that structural features of the riverbed primarily contribute to the ‘Fair’ condition of the BMI community.

The food source for many BMI species is largely dependent upon the input of organic matter from upstream sources. Species in the shredder functional feeding group rely on the steady stream of coarse organic matter such as leaf litter or twigs. Slab Creek Dam greatly reduces the inflow of coarse organic matter into the ¼-mile reach, although coarse organic matter is injected into the bottom part of the reach by Iowa Canyon Creek. The data from the 2010 surveys reflect this by a relative lack (4.3% and 2.2% respectively) of shredder species in the two sites located in the ¼-mile reach. Conversely, Iowa Canyon Creek results showed a more balanced BMI community assemblage. The dam also impedes the downstream drift and dispersal of insects from upstream sources, which is one form of BMI colonization in river systems.

### Table 5.3.2-1. Wetted channel area (ft²) for a range of flow from 10 to 63 cfs.

<table>
<thead>
<tr>
<th>Discharge</th>
<th>Wetted channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>107,000</td>
</tr>
<tr>
<td>20</td>
<td>109,800</td>
</tr>
<tr>
<td>25</td>
<td>111,400</td>
</tr>
<tr>
<td>30</td>
<td>112,700</td>
</tr>
<tr>
<td>35</td>
<td>114,400</td>
</tr>
<tr>
<td>63</td>
<td>120,900</td>
</tr>
</tbody>
</table>
Another factor potentially influencing the composition and distribution of invertebrates within the benthic community of the ¼-mile reach is the presence of the invasive alga (*Didymosphenia geminata* [Didymo]). Didymo may have recently become established within SFAR below Slab Creek Dam where it may outcompete the native periphyton on which many BMI taxa graze (Flöder and Kilroy 2009). Within the ¼-mile reach, the highest concentrations of Didymo exist between the tail-out of the plunge pool at the base of the dam downstream to near the confluence with Iowa Canyon Creek. Below this point the alga appeared to diminish in abundance. The presence of Didymo attached to the coarse substrate and bedrock likely contributed to the ‘Fair’ condition of the BMI community in 2010, although the same condition was assigned to the BMI community in 2002 and 2003, when the presence of Didymo was not noted by field personnel. Regardless, the 2010 study reveals a general lack of the scraper functional feeding group, which typically grazes on periphyton attached to substrate. Additionally, Chironomids comprise the majority of the Dipteran populations within the ¼-mile reach. Similarly, Gillis and Chalifour (2010) found an obvious shift in community balance from EPT species toward Chironomids following the introduction of Didymo to a regulated (buffered) river characterized by cold water and substrate stability.

The proposed flow regime in the ¼-mile reach is not likely to alter Didymo populations presently occupying the reach. Reductions in the distribution of water velocity and depth associated with the proposed flow regime would not impact Didymo given its wide range in velocity and depth tolerances. The growth of Didymo is not known to be water velocity dependent, short of extreme velocities that result in detachment. The slight warming expected in the ¼-mile reach (Stillwater Sciences 2012a) will have no impact on Didymo growth or coverage, given that growth of Didymo is not known to be water temperature dependent.

Collectively, the proposed flow regime would only impact Didymo by reducing the physical surface area it potentially could colonize (see Table 5.3.2-1). Information from the scientific literature does not suggest that the relatively minor environmental changes associated with a flow reduction of this magnitude would trigger a nuisance bloom of this alga, given that the flow reduction primarily only impacts physical habitat (AECOM 2012).

The primary factor that influences Didymo population size is high flow events that mobilize the substrate of the ¼-mile reach and dislodge Didymo stalks. For example, U.S. Geological Survey records show the most recent flow capable of resulting in channel bed mobilization (Tetra Tech 2011) occurred on December 31, 2005, when peak flow (and spill over Slab Creek Dam) achieved a volume of 28,600 cfs. A flow of this magnitude would certainly have resulted in Didymo detachment and a reduction in the periphyton density. Flow events of this magnitude recur on average once every 10 years.
SMUD will monitor BMI and algae to examine the effect of the reduced-flow regime on these resources in the ¼-mile reach. BMI and algae monitoring will be conducted in the ¼-mile reach in conformance with monitoring requirements of the new UARP license.

5.3.2.2 Fish

As described in Section 5.3.1.2, the predominant fish species in the ¼-mile reach include rainbow and brown trout. Hardhead, a Forest Service Sensitive species, while present in Slab Creek Reservoir and in the river both upstream of the reservoir and approximately five miles downstream of the Project area, are not found in the ¼-mile reach due in large part to the cold water temperatures (see Section 5.2.1.2).

Construction and operation of the Project has the potential to adversely affect existing trout populations. These effects include, reduced habitat in the ¼-mile reach, cessation of surface flow in segments of the ¼-mile reach, and sedimentation of the SFAR and Iowa Canyon Creek during construction. With respect to streamed sedimentation, SMUD will minimize the deleterious effects on fish populations by adhering to BMPs during construction, as described in Section 5.2.2.2.

The proposed release schedule from Slab Creek Dam of between 15 and 36 cfs (see Table 3.1.3-1) will result in an overall reduction in adult trout habitat and increase juvenile habitat within the ¼-mile reach compared to levels that exist under the new license minimum release requirements (Tetra Tech 2011). Under the new license, Slab Creek Dam releases are fairly constant during July through February, ranging from 63 to 90 cfs dependent on the water year type. The average flow during this period across all water year types is approximately 75 cfs. This average flow value corresponds to an adult usable area value of 30,000 ft² (based on suitable depth and velocity) that is potentially available in the ¼-mile reach compared to 12,500 ft² under the lowest proposed release of 15 cfs in Dry and Critical Dry water years (Figure 5.3.2-1). Thus, under worst case conditions, the proposed 15 cfs release in some years will reduce the available adult-weighted usable area by approximately 58%. For juvenile trout, the opposite is the case. A flow of 75 cfs will produce approximately 20,000 ft² of available juvenile habitat compared to 23,500 ft² under 15 cfs, which represents an increase of 17.5 percent (Figure 5.3.2-1).

Field surveys have shown that flows of 20 and 36 cfs provide surface flow throughout the entire ¼-mile reach, but flows of 10 cfs result in an absence of surface flow in the section of river between the plunge pool directly below the dam and the upstream end of the large pool underneath the pedestrian bridge – a distance of approximately 550 feet. This segment of the river is dominated by very large, colluvially-derived boulders that to some extent have been rearranged by very high flows into stable, energy-dissipating structures (Tetra Tech 2011). As an added complication, the morphology of the channel between the dam is also influenced by angular waste-rock from dam construction in the 1960s (see Appendix A, Photos 8 and 9). These field surveys suggest that flows of 15 cfs may also result in an absence of surface flow in the 550-foot
segment of the SFAR. To counter this possibility, SMUD will move large boulders, concrete debris, and waste rock from the main river channel to a point on top of an existing high lateral bar adjacent to the main channel. This SFAR Habitat Improvement Plan is expected to create riffle habitat and expose surface flow through 550 foot segment of the ¼-mile reach. SMUD will develop a SFAR Habitat Improvement Plan, in consultation with the USFS, CDFW, USFWS, and SWRCB for the rock removal. The plan will also include a post-construction surface flow monitoring sub-plan that will determine the effectiveness of the habitat improvement plan. The plan will be incorporated into the 401 Water Quality Certification, 404 Dredge and Fill Permit, and 1602 Streambed Alteration Agreement.

The effect on trout populations of a reduction in available adult trout habitat coupled with an increase in juvenile habitat is uncertain given the potentially overriding influence of other habitat variables not included in the habitat modeling. The uncertainty is centered on the question of whether available spatial habitat, as defined by suitable depth and velocity is the driving variable that determines trout abundance and/or biomass, or whether trout abundance is more strongly influenced by inherent limitations in food production and spawning/rearing habitat.

Figure 5.3.2-1: Total weighted useable area for juvenile and adult rainbow trout for a range of flows from 5 to 450 cfs.
The Project will likely enhance trout populations in the ¼-mile reach by reconfiguring the channel profile and structure of Iowa Canyon Creek as part of the plan to rebuild the existing bridge. Construction of the new bridge will allow SMUD to improve the mouth of Iowa Canyon Creek. By removing a significant portion of the aggraded material in the lower portion of the creek, returning the lower portion of the creek channel as close as possible to natural grade and dimensions, and constructing a set of boulder-step structures, the existing problem of summer/fall surface flow intermittency and the resulting impediment to outmigration will be diminished if not eliminated in all years. The result will be that downstream migrating rainbow trout, including young-of-the-year, will contribute to the population in the ¼-mile reach. Prior to commencing construction, SMUD will develop an Iowa Canyon Creek Reconfiguration Plan in consultation with state and federal resource agencies. The plan will include a statement of the character and quantity of materials to be removed from the creek as well as effects on aquatic resources of removing sediment at the mouth of the creek.

The Project will also enhance trout populations in the ¼-mile reach by implementing a SFAR Gravel Augmentation Plan. The plan will focus on increasing the amount of spawning gravel in the 600-foot segment of ¼-mile reach between the large pool and new powerhouse. The plan will involve piling gravel along the SFAR bank near the proposed whitewater boating put-in where it will be entrained and dispersed by fluvial transport to downstream depositional areas such as the lee of large boulders. The approach is logistically straightforward given the presence of a road leading to the boating put-in location; the high flow for fluvial transport will be provided by the spill flows that are common to Slab Creek Dam in Above Normal and Wet water years. SMUD may use source gravel derived from the Iowa Canyon Creek Reconfiguration Plan, if sufficient quantities are available. SMUD expects to place approximately 200-300 cubic yards of gravel; subsequent replenishment of the gravel pile will be determined by regular monitoring of the pile size and gravel distribution throughout the 600-foot segment of the SFAR. SMUD will develop a SFAR Gravel Augmentation, in consultation with the USFS, CDFW, USFWS, and SWRCB for the rock removal. The plan will be incorporated into the 401 Water Quality Certification, 404 Dredge and Fill Permit, and 1602 Streambed Alteration Agreement.

In summary, the Project will not significantly alter the overall distribution and diversity of fish species throughout the 8-mile Slab Creek Dam Reach, primarily because it only influences a ¼-mile of this reach. The Project is also likely to have little to no effect on fish resources within the ¼-mile reach. While flow reduction in the reach will reduce spatial habitat for adult rainbow trout, the SFAR Habitat Improvement Plan, SFAR Gravel Augmentation Plan, and Iowa Canyon Creek Reconfiguration Plan will enhance trout population dynamics in the river. Additionally, trout populations will be enhanced in Iowa Canyon Creek.

SMUD will monitor fish populations in the ¼-mile reach in accordance with the fish population monitoring program associated with the new UARP license. This monitoring
program will enhance our understanding of fish populations in the SFAR. Because of the difficulty of electrofishing during late summer/early fall months, when flows under the new license range from 63 to 90 cfs, snorkeling surveys, using a bounded count methodology to estimate numbers of individuals by age class (Mohr and Hankin 2005) may be the most practical means of monitoring fish populations. However, the minimum flows proposed for the ¼-mile reach may allow electrofishing.

5.3.2.3 Amphibian and Aquatic Reptiles

The Project will not affect special-status amphibian or aquatic reptiles. Surveys conducted during 2010 in the ¼-mile reach and lower Iowa Canyon Creek did not document any special-status amphibian or aquatic reptile species in the Project area.

5.4 Botanical Resources

5.4.1 Affected Environment

The Project has the potential to affect a number of botanical resources in the general Project area. This includes special-status plants, which may be affected by Project construction, including the powerhouse and powerline. Riparian vegetation, including jurisdictional wetlands will be affected by the construction of the powerhouse facilities, and invasive weeds could be spread by construction and operation of the new powerhouse.

The land area potentially affected by construction activities of the Project centers on three primary locations: (1) land to be disturbed during construction of the powerhouse, including the entire construction zone footprint encircling the powerhouse, equipment lay-down, and construction offices; (2) a strip of land 200 feet wide, centered on the old construction road that will be used for access to the site and the powerline route from the new powerhouse and the White Rock Tunnel Gate House; and (3) the proposed boating put-in on the SFAR and the trail leading to it. Within this potentially affected land area of approximately 16 acres (6.5-ha), field surveys conducted in 2010 (Stillwater Sciences 2011a), reveal the presence of seven vegetation types (Table 5.4.1-1).

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>Acres (Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Alnus rhombifolia</em> Forest Alliance</td>
<td>0.98 (0.40)</td>
</tr>
<tr>
<td><em>Mimulus (guttatus)</em> Herbaceous Alliance</td>
<td>0.14 (0.05)</td>
</tr>
<tr>
<td><em>Pseudotsuga menziesii</em> Forest Alliance</td>
<td>5.24 (2.12)</td>
</tr>
<tr>
<td><em>Quercus kelloggii</em> Forest Alliance</td>
<td>1.49 (0.60)</td>
</tr>
<tr>
<td><em>Quercus wislizeni</em> Woodland Alliance</td>
<td>3.88 (1.60)</td>
</tr>
<tr>
<td><em>Rubus armeniacus</em> Semi-Natural Shrubland Series</td>
<td>0.58 (0.23)</td>
</tr>
<tr>
<td><em>Salix lasiolepis</em> Shrubland Alliance</td>
<td>0.26 (0.10)</td>
</tr>
</tbody>
</table>

Table 5.4.1-1. Summary of vegetation types documented in the construction area of New Slab Creek Powerhouse Project area.

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**Table 5.4.1-1. Summary of vegetation types documented in the construction area of New Slab Creek Powerhouse Project area.**

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>Acres (Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water/River Channel</td>
<td>0.79 (0.32)</td>
</tr>
<tr>
<td>Roads and Trails/Boater Put-in</td>
<td>2.78 (1.13)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16.14 (6.53)</strong></td>
</tr>
</tbody>
</table>

*Alnus rhombifolia* Forest Alliance

*Alnus rhombifolia* Forest Alliance, covering an area of 0.98 acre, is found along both sides of the SFAR within the wetland/riparian corridor adjacent to the construction site. This alliance typically has a low absolute cover of *Alnus rhombifolia* (white alder) but is a dominant or co-dominant in the tree canopy with *Salix lasiolepis* (arroyo willow). With only occasional emergent shrubs and vines such as *Philadelphus lewissii*, *Rubus discolor*, and *Salix exigua* (narrowleaf willow), the herbaceous cover is generally less than five percent. Common herbaceous species include *Heuchera micrantha*, *Melilotus albus* (white sweetclover), *Torilis arvensis*, *Vicia hirsuta*, and *Vulpia myuros*.

*Mimulus (guttatus)* Herbaceous Alliance

*Mimulus (guttatus)* Herbaceous Alliance covers 0.14 acre in the Project area in two locations: (1) on the rock face above the portal of White Rock Tunnel Adit 3; and (2) south and uphill of the existing White Rock Tunnel Gate House within the rocky outcrops containing seeps. This alliance typically has very low tree canopy cover, predominantly in the form of overhanging shade; *Mimulus guttatus* is characteristically present along with a variety of other herbaceous species. In addition to *Mimulus guttatus*, other native herbaceous species included *Heuchera micrantha* and *Clarkia biloba* ssp. *brandegeeae*. Non-native herbaceous species within this vegetation alliance are *Avena barbata* and *Poa secunda* ssp. *secunda* (one-sided bluegrass).

The *Pseudotsuga menziesii* Forest Alliance, covering 5.24 acres in the Project area, is one of the dominant vegetation types found south of the SFAR on the northwest- and west-facing upland slopes. This alliance typically has *Pseudotsuga menziesii* as a dominant or co-dominant species within the tree layer; co-dominants include a variety of *Quercus* (oak) and *Pinus* (pine) species as well as *Calocedrus decurrens* (incense cedar). The shrub layer is diverse and includes a variety of native shrubs: *Aesculus californica*, *Arctostaphylos viscida* (sticky whiteleaf manzanita), *Ceanothus integerrimus* (deerbrush), *Heteromeles arbutifolia* (toyot), and *Philadelphus lewissii*. Dominant herbaceous species include *Avena barbata*, *Lonicera hispidula* var. *vacillans*, *Madia elegans*, and *Trifolium hirtum*.
**Quercus kelloggii** Forest Alliance

*Quercus kelloggii* Forest Alliance, covering 1.49 acres in the Project area, is one of the dominant vegetation types found north of the SFAR on the south-facing slopes. This alliance typically has *Quercus kelloggii* as a dominant or co-dominant species within the tree layer; co-dominants include a variety of *Quercus* and *Pinus* species. The shrub layer includes *Arctostaphylos viscida, Ceanothus integerrimus, Lupinus albifrons, Rhamnus rubra* (Sierra coffeeberry), and *Toxicodendron diversilobum*. Dominant herbaceous species include *Avena barbata, Lotus scoparius* (common deerweed), *Madia elegans*, and *Vicia hirsuta*.

**Quercus wislizeni** Woodland Alliance

*Quercus wislizeni* Forest Alliance, covering 3.88 acres in the Project area, is one of the dominant vegetation types found south of the SFAR on dry northwest-facing upland slopes. This alliance typically has *Quercus wislizeni* as a dominant or co-dominant species within the tree layer; however, if other tree species are co-dominant, they have less cover than *Quercus wislizeni*. The shrub layer includes *Arctostaphylos viscida, Heteromeles arbutifolia, Keckiella breviflora* var. *breviflora, Philadelphus lewisii, Quercus berberidifolia* (scrub oak), and *Toxicodendron diversilobum*. Associated herbaceous species include a mix of native and nonnative species: *Bromus diandrus, Bromus tectorum, Cerastium glomeratum* (sticky chickweed), *Clarkia heterandra* (mountain clarkia), *Dichelostemma volubile* (twining snakelily), *Eriophyllum lanatum* var. *achillaeoides, Heuchera micrantha, Hypericum perforatum, Lactuca serriola* (prickly lettuce), *Mimulus guttatus, Pentagramma triangularis* ssp. *triangularis* (goldback fern), *Torilis arvensis, Vicia hirsuta*, and *Vulpia myuros*.

**Rubus armeniacus** Semi-Natural Shrubland Series

*Rubus armeniacus* Semi-Natural Shrubland Series occurs in a 0.58 acre patch on the north side of the SFAR, downslope of a footpath that parallels the river. This alliance typically has *Rubus discolor* (also known as *Rubus armeniacus*) as a dominant within the shrub layer with few, if any, emergent trees. Within the Project area patch *Rubus discolor* constitutes nearly 50% cover. Co-dominant at approximately 20% cover is *Vitis californica* (California wild grape). *Quercus chrysolepis* is occasional within the tree layer, between 1–5%. Additional associated shrubs or sub-shrubs include *Keckiella breviflora* var. *breviflora, Lotus scoparius*, and *Lupinus albifrons*. Associated herbaceous species include *Brassica nigra* (black mustard), *Centaurea solstitialis, Cordylanthus tenuis* (slender bird’s beak), *Lotus purshianus* var. *purshianus* (American bird’s-foot trefoil), *Phacelia heterophylla*, and *Vicia hirsuta*.
Salix lasiolepis Shrubland Alliance

The *Salix lasiolepis* Shrubland Alliance occurs over 0.26 acres along the Iowa Canyon Creek wetland/riparian corridor. This alliance typically has *Salix lasiolepis* as a dominant or co-dominant species in the tree or shrub layer. The only emergent tree in the survey area is a *Pinus ponderosa* sapling with less than one percent cover. Associated shrubs or sub-shrubs include *Keckiella breviflora* var. *breviflora*, *Philadelphus lewisii*, and *Rubus discolor*. One individual *Cytisus scoparius* was documented within this vegetation type. Associated herbaceous species include *Asclepias fascicularis* (narrow-leaf milkweed), *Brassica nigra*, *Bromus diandrus*, *Bromus tectorum*, *Daucus carota* (Queen Anne’s lace), and *Lactuca serriola*.

5.4.1.1 Riparian Vegetation and Wetlands

A focused survey of riparian vegetation in the ¼-mile reach and Iowa Canyon Creek was conducted to evaluate potential flow-related effects of the Project (ECORP 2011d). The surveys revealed the presence of three riparian vegetation alliance types, distinguished primarily on the basis of dominance between alder and willow species:

- **Alnus rhombifolia Forest Alliance** — the white alder alliance comprises approximately 0.5 acre of the ¼-mile reach. All areas mapped within this alliance occur downstream (west) of the confluence of Iowa Canyon Creek with the SFAR, in front of the adit and on the opposite bank. This alliance exists in the riparian zone at the White Rock Tunnel Adit #3, where the Project is proposed to be located. The alliance is also present in other locations in the general vicinity of the proposed new powerhouse tailrace outfall.

- **Salix lasiolepis Shrubland Alliance** — the willow (riparian scrub) alliance comprises approximately 1.6 acres of the ¼-mile reach and Iowa Canyon Creek. White alders are also scattered throughout this alliance; however, they are not a dominant species within the alliance. This alliance occurs along the lower portion of Iowa Canyon Creek to the confluence with the SFAR, and at several locations upstream (east) of the confluence.

- **Salix-Alnus Alliance** — the willow-alder alliance comprises approximately 0.3 acre of the ¼-mile reach. Two stands of this alliance are found in a narrow band along the south bank of the river. One band lies along the banks of the large pool below the pedestrian bridge. This band extends downstream to the proposed whitewater boating put-in on the south bank of the SFAR.

In addition to these alliances, large areas of the SFAR riparian zone are not vegetated, classified either as barren or exposed non-water features (Appendix A, Photo 13).

Potential jurisdictional wetlands were delineated in the field over an area of 1.45 acres using the Level 2 routine methodology described in the *Corps of Engineers Wetlands Delineation Manual* (Stillwater Sciences 2011b). A total of 0.2 acre of jurisdictional

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wetlands was identified at two locations: adjacent to the White Rock Tunnel Adit #3 Portal and along the banks of the SFAR (see Figure 5.0-1). The adit portal wetland has been created by a small stream of water that perennially trickles out of the adit, an accumulation of fine sediment at the portal and sufficient sunlight to support wetland vegetation. The wetland is a palustrine persistent emergent wetland, and is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (Cowardin et al. 1979). Dominant plant species within the overstory include Salix lasiolepis (FACW) and Alnus rhombifolia (FACW), with Rubus armeniancus (FACW) in the shrub/vine layer. Dominant herbaceous species include Mimulus guttatus (OBL) and Holcus lanatus (FAC; common velvet grass). The wetland adjacent to the SFAR is a palustrine persistent shrub/scrub wetland and is characterized by woody vegetation less than 20-feet-tall including shrubs and young trees (Cowardin et al. 1979). Dominant plant species include Salix lasiolepis (FACW) and Rubus armeniancus (FACW) in the shrub/vine layer. No herbaceous species were found within the understory.

5.4.1.2 Special-status Species

Surveys conducted in the Project construction zone during 2010 revealed the presence of two special-status vascular plant species, Clarkia biloba ssp. Brandegeae, Brandegee’s clarkia, and Torreya californica, California nutmeg, in the Project area (Stillwater Sciences 2011a). Neither of these species is federally or State listed; however, Clarkia biloba ssp. brandegeae is on the CNPS List 4 and USFS Watchlist, while Torreya californica is only on the USFS Watchlist. Figure 5.4.1-1 illustrates the single location where Torreya californica was found and the 14 locations where Clarkia biloba ssp. brandegeae was found. The population levels at the different occurrences of Brandegee’s clarkia varied significantly from a low of one representative plant to an estimated high of 1,500 plants.
Figure 5.4.1-1: Special-status plant population locations documented during 2010 botanical survey.
Brandegee’s Clarkia

Brandegee’s clarkia is an annual in the Onagraceae (evening primrose) family classified as a CNPS List 4, and on the USFS Watchlist. It is limited to the northern Sierra Nevada foothills, specifically Butte, El Dorado, Nevada, Placer, Sacramento, Sierra, and Yuba counties, from 240 to 3,000 feet (CNPS 2010). The species typically occurs in foothill woodlands (Hickman 1993), chaparral, roadcuts in lower montane coniferous forest, and cismontane woodlands (CNPS 2010). The closely related and common Clarkia biloba ssp. biloba (twolobe clarkia) is very similar to the rare Clarkia biloba ssp. brandegeaeae; the two species differ in the length of the petal lobe compared to the length of the petal (i.e., the common species has a deeper petal lobe, with the lobe between one-fifth and one-half the petal length; the rare species has a shallower petal lobe, with the lobe less than one-fifth the petal length). Brandegee’s clarkia blooms from May to July.

The 14 different populations of Brandegee’s clarkia occurring in the Project area are found in similar habitats mostly on roadcuts with aspect varying from north-northwest to southeast facing slopes; the associated rocky slopes are generally fairly steep (i.e., >60% slope). Site quality is good for most of the populations, although several populations have a site quality of fair.

California Nutmeg

California nutmeg is an evergreen tree (or shrub on serpentinite substrates) in the Taxaceae (yew) family that is classified as a USFS Watchlist species. Although somewhat widely distributed across California from 100 to 3,000 feet (Hickman 1993), this California endemic is not abundant and is only occasional found within the ENF. California nutmeg typically occurs in shady forest or woodland canyons, sometimes chaparral or streamside locations (Hickman 1993, USFS 2008). The species blooms from April to May.

Only one population of California nutmeg was found in the survey area during 2010 botanical surveys. This population consisted of a single sapling that was less than eight feet tall. The sapling was found at the hill toe-slope near the confluence of Iowa Canyon Creek and the SFAR, adjacent to the narrow road. The sapling is within the understory of Umbellularia californica (California laurel); additional plant associates include Cynosurus echinatus, Keckiella breviflora var. breviflora, Lonicera hispidula var. vacillans (pink honeysuckle), Torilis arvensis, and Toxicodendron diversilobum. Site quality is fair due to potential road maintenance and the future Project construction.

5.4.1.3 Invasive and Noxious Plants

Surveys conducted in 2010 revealed the presence of two high-priority and eighteen low-priority invasive plant species in the area potentially affected by the Project. Table 5.4.1-2 illustrates the high-priority invasive plants documented in the survey area (i.e.,...
**Centaurea solstitialis** [yellow star-thistle] and **Cytisus scoparius** [Scotch broom]. Scotch broom only appears in sparse (1-10 plants) and patchy abundance (11-50 plants) at three locations within the general Project area, while yellow star-thistle is widespread (51-100) and infested (100+ plants).

Of the low-priority species located in the survey area, seven exhibit a widespread distribution throughout the survey area, appearing in each of the four regions sampled in 2010. These species include **Bromus diandrus**, **Bromus tectorum** (cheatgrass), **Cynosurus echinatus**, **Hypericum perforatum** (common St. Johnswort), **Torilis arvensis**, **Trifolium hirtum**, and **Vulpia myuros**. Several documented low-priority species only occur sporadically within the survey area, including **Aegilops triuncialis** (barbed goatgrass), **Brachypodium distachyon** (purple false brome), **Holcus lanatus** (common velvetgrass), and **Lathyrus latifolius** (perennial pea).

### Table 5.4.1-2. Summary of high-priority targeted, invasive plant species documented in the survey area.

<table>
<thead>
<tr>
<th>Population Number</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Abundance</th>
<th>Percent Cover</th>
<th>Patch Size (Gross Area) ft² (m²)</th>
<th>Patch Size (Infested Area) ft² (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>W_1</td>
<td><em>Cytisus scoparius</em></td>
<td>Scotch broom</td>
<td>Patchy</td>
<td>30%</td>
<td>300 ft² (27.9 m²)</td>
<td>27 ft² (2.5 m²)</td>
</tr>
<tr>
<td>W_2</td>
<td><em>Cytisus scoparius</em></td>
<td>Scotch broom</td>
<td>Patchy</td>
<td>30%</td>
<td>1,500 ft² (139.4 m²)</td>
<td>135 ft² (12.5 m²)</td>
</tr>
<tr>
<td>W_3</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Sparse</td>
<td>50%</td>
<td>1 ft² (0.1 m²)</td>
<td>0.3 ft² (&lt;0.1 m²)</td>
</tr>
<tr>
<td>W_4</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Sparse</td>
<td>50%</td>
<td>1 ft² (0.1 m²)</td>
<td>0.3 ft² (&lt;0.1 m²)</td>
</tr>
<tr>
<td>W_5</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Sparse</td>
<td>20%</td>
<td>25 ft² (2.3 m²)</td>
<td>1 ft² (0.1 m²)</td>
</tr>
<tr>
<td>W_6</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Widespread</td>
<td>5%</td>
<td>5,000 ft² (464.5 m²)</td>
<td>12.5 ft² (1.2 m²)</td>
</tr>
<tr>
<td>W_7</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Patchy</td>
<td>2%</td>
<td>350 ft² (32.5 m²)</td>
<td>0.1 ft² (&lt;0.1 m²)</td>
</tr>
<tr>
<td>W_8</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Sparse</td>
<td>2%</td>
<td>25 ft² (2.3 m²)</td>
<td>0 ft² (&lt;0.1 m²)</td>
</tr>
<tr>
<td>W_9</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Infested</td>
<td>2%</td>
<td>2250 ft² (209 m²)</td>
<td>0.9 ft² (0.1 m²)</td>
</tr>
<tr>
<td>W_10</td>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star-thistle</td>
<td>Infested</td>
<td>2%</td>
<td>6750 ft² (627.1 m²)</td>
<td>2.7 ft² (0.3 m²)</td>
</tr>
<tr>
<td>W_11</td>
<td><em>Cytisus scoparius</em></td>
<td>Scotch broom</td>
<td>Sparse</td>
<td>75%</td>
<td>6 ft² (0.6 m²)</td>
<td>3.4 ft² (0.3 m²)</td>
</tr>
</tbody>
</table>

Sparse = 1–10 plants observed; Patchy = 11–50 plants observed; Widespread = 50–100 plants observed; Infested = 100+ plants observed.
Yellow Star-Thistle

*Centaurea solstitialis* (yellow star-thistle) is a winter annual or biennial in the Asteraceae (sunflower) family. It is one of the most serious rangeland weeds and is rated high by Cal-IPC (i.e., species has severe ecological impacts, high rates of dispersal and establishment, and is widely distributed across habitats) and pest rating C by the California Department of Food and Agriculture (CDFA) (i.e., widespread invasive weed with known economic or environmental detriment). Native to Southern Europe, it aggressively reproduces by seed. It is common below 4,270 feet (1,300 m) throughout the California Floristic Province and Mojave Desert (Hickman 1993) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed sites such as roadsides and waste places (DiTomaso and Healy 2007). It flowers from May through October (Hickman 1993).

Eight populations of *Centaurea solstitialis* exist within the survey area. Populations vary in abundance from sparse to infested. Half the populations are under 25 ft$^2$ with less than 10 plants located within the population, while three populations are over 2,200 ft$^2$, two of which contain well over 100 individuals. The total geographic extent of all eight populations is approximately 0.33 acre, with a weighted area of infestation of 18 ft$^2$.

Scotch Broom

*Cytisus scoparius* (Scotch broom) is a shrub in the Fabaceae (legume) family and is rated as highly invasive by Cal-IPC (i.e., species has severe ecological impacts, high rates of dispersal and establishment, and is widely distributed across habitats) and class C by CDFA (i.e., widespread invasive weed with known economic or environmental detriment). Native to southern Europe and northern Africa, *Cytisus scoparius* was introduced as a landscape ornamental and planted in many areas for erosion control; it is found in sandy soils in mountainous regions and cool coastal areas with dry summers (DiTomaso and Healy 2007). In these areas it invades open disturbed sites such as logged or burned areas, roadsides, and pastures, as well as undisturbed grasslands, coastal scrub, oak woodlands, riparian corridors, and open forests. *Cytisus scoparius* is common below 3,280 feet (1,000 m) throughout northwestern California, the Cascade Range and Sierra Nevada foothills, central valley, San Francisco Bay Area, and southern California coast (Hickman 1993). It aggressively reproduces by seed and is difficult to eliminate due to both long-lasting seed banks and its ability to re-sprout from crown fragments. *Cytisus scoparius* flowers from April through June (Munz and Keck 1973).

Three populations of *Cytisus scoparius* exist within the survey area. Populations vary in abundance from sparse (1–10 plants) to patchy (11–50 plants). The total geographic extent of all three populations is approximately 0.04 acre, with a weighted area of infestation of 165 ft$^2$.
5.4.2 Environmental Effects of Project

5.4.2.1 Riparian Vegetation and Wetlands

The construction of the Project and appurtenant facilities will result in the permanent loss of approximately 200 linear feet of riparian vegetation along the south bank of the SFAR. Much of the riparian vegetation lost falls within the boundaries of Waters of the U.S. and Waters of the State, within the *Alnus rhOMBifolia* (White Alder) Forest Alliance, and amounts to approximately 0.1 acre. A focused field study (Stillwater Sciences 2011b) of the site reveals the riparian vegetation loss within the construction footprint will include 22 alder trees with a diameter at breast height (DBH) greater than two inches (Table 5.4.2-1).

A focused field study (Stillwater Sciences 2011b) identified 38 riparian and upland trees greater than 2 inches DBH (diameter at breast height) within the proposed footprint of the new powerhouse and appurtenant facilities (Table 5.5.2-1).

<table>
<thead>
<tr>
<th>Species</th>
<th>DBH (in)</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Alnus rhombifolia</em> (White alder)</td>
<td>2-6</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>6-8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Greater than 8</td>
<td>1</td>
</tr>
<tr>
<td><em>Pseudotsuga menziesii</em> (Douglas fir)</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td><em>Quercus chrysolepis</em> (Canyon live oak)</td>
<td>12-14</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>14-16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>16-20</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>20-24</td>
<td>2</td>
</tr>
<tr>
<td>Subtotal</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td><em>Umbellularia californica</em> (California bay)</td>
<td>3-4</td>
<td>6</td>
</tr>
<tr>
<td>Subtotal</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>38</strong></td>
<td></td>
</tr>
</tbody>
</table>

The Iowa Canyon Creek Reconfiguration Plan, while temporarily removing riparian vegetation along a linear distance of approximately 200 feet, is not expected to result in a long-term loss of riparian vegetation in the overall project area, which includes the SFAR and Iowa Canyon Creek. By excavating fill material as part of the reconfiguration plan, Iowa Canyon Creek will be returned to its historic grade and orientation. The lower segment of the stream will be widened, forming a broader delta than the current delta. Under the plan, to be developed in consultation with resource agencies, SMUD expects to plant riparian vegetation representative of the white alder or willow alliances in the new delta. This re-vegetation of white alder in a broader delta than currently
exists will compensate for the loss of the 22 alder trees in the Project footprint along the SFAR.

A portion of the riparian vegetation in the ¼-mile reach lies on USFS land and is therefore subject to the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (ROD) and the Eldorado National Forest Land and Resource Management Plan. The riparian area subject the ROD and Plan extends from the base of Slab Creek Dam to a point approximately 300 feet upstream of the confluence with Iowa Canyon Creek (see Figure FNLAA G-1). The ROD contains six Riparian Conservation Objectives for Riparian Conservation Areas. In a few cases, the objectives focus on riparian vegetation associated with special aquatic features such as meadows, lakes, ponds, bogs, fens, and wetlands, which don’t apply to the Project area. With respect to riparian zones along rivers and streams, the objectives include the maintenance or restoration of streamflows, and the preservation of water quality, species viability, plant and animal community diversity, special habitats, watershed conditions, stream banks, and biological conductivity. While the proposed Project streamflows in the ¼-mile reach (see Table 3.1.3-1) represent reductions from the requirements of the new license, the resource preservation objectives (e.g., water quality, stream banks) are expected to be sustained under these flows. Thus, in general, the riparian vegetation within the ¼-mile reach is not expected to be affected by the proposed flow regime.

A total of 0.02 acre of jurisdictional wetland will be lost due to the construction of the powerhouse facilities (see Figure 5.0-1). Because the Project will affect Waters of the U.S. and wetlands, SMUD reviewed the Protection of Wetlands BMP of the U.S. Forest Service Region 5 (USFS R5 2011). Accordingly, SMUD has determined there is no viable alternative to siting the Project at the adit. Iowa Canyon Creek enters the SFAR just upstream of the adit, thereby precluding construction of the powerhouse at a site upstream of the adit. The powerhouse cannot be sited downstream of the adit due to engineering constraints and construction-related logistical limitations. SMUD will work with the USACE and the CDFW to develop measures that compensate for the loss of jurisdictional wetlands.

5.4.2.2 Special-Status Species

Twelve of the 14 existing populations of *Clarkia biloba* ssp. *brandegeae* in the Project area have the potential to be impacted directly by Project construction or indirectly by Project operation. Two populations of *Clarkia* located near the adit portal will likely be eliminated during Project construction. The largest of these is a population estimated between 100-125 plants growing on the rock face bordering the trail leading to the White Rock Tunnel Adit #3 (Appendix A, Photo 14). The other is a population of three plants on the same rock face, not more than 50 feet up the trail. During construction of the yard behind the powerhouse, fill material will cover the rock face eliminating both areas as potential habitat. The loss of as many as 128 plants, which represents a 2.7 percent reduction in the 4,655 plants observed in the Project area, does not represent a
significant impact to the project-area-specific occurrence of this species nor the species at large.

The remaining 10 existing populations in the Project area are unlikely to be impacted by Project construction as they lie in areas outside the powerhouse footprint. However, these populations could be negatively affected by powerline pole placements and indirectly affected by Project operations such as road grading and maintenance, vegetation clearing and trimming, ditch cleaning, and invasive species treatments. Another two populations along a footpath on the north side of the river could be affected by recreational boaters using the path as ingress to the river.

The single plant of *Torreya californica* located in the Project area is likely to be impacted by Project construction. This plant also resides along the same rock face, but far from the area of powerhouse yard fill. Nevertheless, because the species will be very close to the road leading to the yard, the likelihood of impact is high. Because only a single plant will be lost, the impact is not considered significant.

To minimize the probability of Project construction and/or operational impacts on *Clarkia biloba* ssp. *Brandegeaeae*, SMUD will implement the following measures as part of a Special-Status Plant Protection Plan:

- Where possible, avoid placement of powerline poles in areas of large populations of *Clarkia biloba* ssp. *Brandegeaeae* to the extent possible;
- Where vegetation disturbing work will occur in the vicinity of a known species population, SMUD will establish and flag a buffer around the population and avoid the use of heavy equipment and/or herbicides in the vicinity when possible;
- Conduct employee awareness training to ensure education about the importance of special-status plant species’ protection;
- Promote recreational boating at the planned boating put-in on the south side of the SFAR, but discourage boaters from crossing the pedestrian bridge and walking down the footpath on the north side; and
- Exclude herbicide treatment around large populations of *Clarkia biloba* ssp. *Brandegeaeae*, following the guidelines developed in consultation with resource agencies and included in the UARP Noxious Weed and Vegetation Management Plan.

### 5.4.2.3 Invasive and Noxious Species

Populations of invasive plant species are generally correlated with high levels of disturbance. Vegetation clearing, ground disturbance, and vehicles associated with Project operations and maintenance, recreation, or proposed construction activities may therefore facilitate the establishment or spread of invasive weeds in the Project area. Of particular concern are the two high-priority invasive weed species documented at the site, *Centaurea solstitialis* and *Cytisus scoparius*. To ensure that increases or spread
of the invasive and noxious plant populations are avoided or minimized, SMUD will implement the following measures as part of an Invasive and Noxious Species Management Plan:

- Educate employees and contractors working in the Project area on implementation of appropriate weed management measures, including washing equipment between job sites, proper disposal of soil and vegetation, and the use of weed-free seed and mulching mixes in re-vegetation and erosion-control efforts;
- Implement and maintain a GIS database of known high-priority invasive plant species within the Project area;
- Consult the GIS database prior to any work on the Project that involves vegetation disturbance, with the goal of preventing spread of invasive plant species;
- If possible, prioritize known high-priority invasive plant populations for eradication and/or treatment according to vegetation management planning efforts and approved guidelines for weed eradication;
- Establish a post-treatment re-vegetation plan to restore areas impacted by construction work;
- Schedule work in weed-free areas prior to work in weed-infested areas, to the extent possible; and
- Clean equipment before moving from a weed-infested site to a relatively weed-free site.

5.5 Wildlife Resources

5.5.1 Affected Environment

The Project has the potential to affect wildlife species in the general Project area. This includes special-status species, birds, and mammals, including bats. While general wildlife surveys were performed during the UARP relicensing studies, much of the information on wildlife habitat and resources contained in this report was generated by field studies performed in the affected Project area in the summer of 2010. These included habitat assessments for special-status wildlife species and bird surveys.

5.5.1.1 Mammals

Thirteen special-status terrestrial wildlife species occur, or have the potential to occur, within the survey area (Stillwater Sciences 2011a). Special-status species for which suitable habitat is present are identified in Table 5.5.1-1 and discussed in further detail below. None of the special-status species identified as having the potential to occur in the survey area were documented during the habitat assessment.
Table 5.5.1-1. Special-status mammal species known to or likely to occur within the potentially affected area of the New Slab Creek Powerhouse Project area.

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Status Federal/State/USFS</th>
<th>Habitat Associations</th>
<th>Likelihood of Occurrence in the Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pallid bat (Antrozous pallidus)</td>
<td>−/SSC/FSS</td>
<td>Roosts in rock crevices, tree hollows, mines, caves, and a variety of vacant and occupied buildings; feeds in a variety of open habitats</td>
<td>High; rock cliffs present in Project area</td>
</tr>
<tr>
<td>Spotted bat (Euderma maculatum)</td>
<td>−/SSC/-</td>
<td>Highly associated with cliffs and rock crevices, although may occasionally use caves and buildings; inhabits arid deserts, grasslands, and mixed coniferous forests</td>
<td>Moderate; highly suitable rock cliffs present in Project area, although presence is uncommon in California</td>
</tr>
<tr>
<td>Western mastiff bat (Eumopsperotis californicus)</td>
<td>−/SSC/FSS</td>
<td>Primarily a cliff-dwelling species though may be found in crevices in large boulders and buildings</td>
<td>High; rock cliffs present in Project area</td>
</tr>
<tr>
<td>California ringtail (Bassariscus astutus raptor)</td>
<td>−/SFP/-</td>
<td>Mixture of forest and shrub habitats in association with rocky areas or riparian habitats, low to middle elevations</td>
<td>Moderate; suitable habitat present in Project area</td>
</tr>
<tr>
<td>Pacific fisher (Martes pennanti pacifica) West Coast DPS</td>
<td>FC/SSC/FSS</td>
<td>Dense advanced-successional conifer forests, with complex forest structure being more important than tree species; den in hollow trees and snags</td>
<td>Low; Project area may not have the complex forest structure required by this species</td>
</tr>
</tbody>
</table>

Federal refers to the Federal Endangered Species Act and Bald and Golden Eagle Protection Act (FC = federal candidate species); State refers to the California Endangered Species Act and the California Fish and Wildlife Code (SSC = Considered a Species of Special Concern by the State of California, SFP = Fully Protected by the State of California); USFS refers to U.S. Forest Service Sensitive Wildlife Species List for the El Dorado National Forest (FSS = U.S. Forest Service Sensitive).

**Pallid bat**

Pallid bats are fairly widespread in California occupying a variety of habitats, from arid deserts to grasslands to conifer forests. Roosts (including day, night, and maternity roosts) are typically located in rock crevices and cliffs, but can also be found in tree hollows and caves (Hermanson and O’Shea 1983, Lewis 1994, Pierson et al. 1996, Pierson et al. 2001). In more urban settings, roosts are frequently associated with human structures such as abandoned buildings, abandoned mines, and bridges (Pierson et al. 1996, Pierson et al. 2001). Overwintering roosts require relatively cool and stable temperatures out of direct sunlight. Pallid bats typically glean prey from the ground (Zeiner et al. 1990a) and may forage 1–3 miles (1.6–4.8 km) from their day roost.

The likelihood of occurrence for this species within the survey area is high as suitable foraging habitat is abundant and rocky cliffs are present in the Project area, particularly along the river margin.
Spotted bat

Spotted bats have a patchy distribution that ranges across much of California, excluding coastal areas and regions north of Mount Shasta. Its presence is limited to rocky areas associated with river drainages from arid deserts to high elevation conifer forests (Luce et al. 2005). Spotted bats roost in crevices and are believed to be non-colonial. Foraging ranges are typically large (up to 25 miles [40 km]); foraging spotted bats glean prey about 30 ft. (10 m) aboveground over open areas and along forest edges, particularly in association with wet meadows (Luce et al. 2005).

Although the survey area has suitable foraging and roosting habitat, likelihood of occurrence for this species is moderate because it is generally uncommon in California.

Western mastiff bat

Western mastiff bats range from the San Francisco Bay area south throughout California, typically roosting below 5,000 feet (1,400 m) but potentially foraging up to 8,850 feet (2,700 m) (Pierson and Siders 2005). A crevice- and cliff-roosting species, western mastiff bats prefer rock features, often steep slopes or rocky outcrops associated with river drainages, or slabs of exfoliating granite or basaltic columns. Colonies range from 35 to 200 individuals. Western mastiff bats forage in open-air environments such as reservoirs over ranges up 18 miles (30 km) (Peirson and Siders 2005).

The likelihood of occurrence for this species within the survey area is high, as suitable foraging habitat is abundant and rocky cliffs are present in the vicinity of the Project area, particularly along the river margin.

Other Bat Species

As stated above, no special-status bat species (or their sign) were documented during the field surveys. However, in the evenings at dusk, many bats varying in size can be seen foraging in the survey area. While it is possible bats may use the adit as a winter hibernation roost, no guano was detected in the adit during the survey. This observation is consistent with the 2002-2003 relicensing bat surveys. During those surveys, no bats were captured in traps set in the adit, nor was there evidence of roosting activities in the adit (DTA 2004a). Temperatures in the adit are likely cool throughout the year; therefore, it is unlikely to be used as summer roosting habitat by bats.
California ringtail

California ringtails, a nocturnal carnivore in the raccoon family, are widely distributed as a non-migratory resident throughout California. The ringtail is found in a variety of environments including riparian, shrub, and forest habitats (Jameson and Peeters 2004). Ringtails eat mainly rodents (woodrats and mice) and rabbits (CDFG and CIWTG 2008), although they also forage on fruits and berries (Jameson and Peeters 2004).

The likelihood of occurrence for this species within the survey area is moderate as suitable hunting and foraging is present and opportunities to den are ample.

Pacific Fisher

Pacific fishers are a medium-sized forest carnivores that are strongly associated with forests exhibiting mature and late-successional characteristics, such as an abundance of large trees, snags, and logs (>100 cm diameter at breast height [DBH]), multiple canopy layers, high canopy closure, and few openings (Zielinski et al., 2004). Mature forests provide the structural characteristics necessary to facilitate Pacific fisher foraging, denning, and dispersal.

Pacific fishers are believed to no longer occur or are extremely rare in ENF (DTA 2004b). However, there is a 1995 record of a Pacific fisher within a 5-mile radius of the Project area (CDFG 2010). Likelihood of Pacific fisher occurring in the Project area is low, due to the lack of complex late-successional forest structure, and the species’ rarity in ENF.

5.5.1.2 Birds

A total of eight special-status bird species are known to or are likely to occur within or near the area of the Project (Table 5.5.1-2).

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Status¹ Federal/State/ USFS</th>
<th>Habitat Associations</th>
<th>Likelihood of Occurrence in the Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bald eagle (Haliaeetus leucocephalus)</td>
<td>FD,BGEP/SE, SFP/ FSS</td>
<td>Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests in advanced-successional conifer forest near open water</td>
<td>High; Project area has moderately suitable nesting and foraging habitat</td>
</tr>
</tbody>
</table>

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¹ Status: Federal (FD), State (ST), US Forest Service (USFS)
### Table 5.5.1-2. Special-status bird species known to or likely to occur within the potentially affected area of the Slab Creek Powerhouse Project area.

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Status¹ Federal/State/USFS</th>
<th>Habitat Associations</th>
<th>Likelihood of Occurrence in the Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern goshawk (Accipiter gentilis)</td>
<td>-/SSC/FSS</td>
<td>Mature and old-growth stands of coniferous forest, middle and higher elevations; nests in dense part of stands near an opening</td>
<td>Low; goshawks typically nest above the elevation of the Project area; however potential for goshawks to use the Project area as foraging habitat</td>
</tr>
<tr>
<td>American peregrine falcon (Falco peregrinus anatum)</td>
<td>FD/SD, SFP/FSS</td>
<td>Wetlands, woodlands, cities, agricultural lands, and coastal areas with cliffs for nesting; often feeds near water</td>
<td>High; rock ledges with commanding views provide nesting habitat in the Project area; plenty of foraging habitat available</td>
</tr>
<tr>
<td>California spotted owl (Strix occidentalis occidentalis)</td>
<td>-/SSC/FSS</td>
<td>Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging</td>
<td>Moderate; while California spotted owls have been documented less than 1 mile away, Project area lacks woody debris on the forest floor (habitat for prey) and lacks large snags for nesting</td>
</tr>
<tr>
<td>Black swift (Cypseloides niger)</td>
<td>-/SSC/-</td>
<td>Nests in moist crevices behind or beside permanent or semi-permanent waterfalls in deep canyons, on perpendicular sea cliffs above surf, and in sea caves; forages widely over many habitats</td>
<td>Moderate; waterfall in Iowa Canyon Creek may provide suitable nesting habitat</td>
</tr>
<tr>
<td>Vaux’s swift (Chaetura vauxi)</td>
<td>-/SSC/-</td>
<td>Redwood and Douglas-fir habitats with large snags</td>
<td>Moderate; minimal suitable-sized snags and trees for nesting in the Project area, although abundant foraging habitat present</td>
</tr>
<tr>
<td>Olive-side flycatcher (Contopus cooperi)</td>
<td>-/SSC/-</td>
<td>Primarily advanced-successional conifer forests with open canopies</td>
<td>Moderate; adequate nesting and foraging habitat in Project area</td>
</tr>
<tr>
<td>Yellow-breasted chat (Icteria virens)</td>
<td>-/SSC/-</td>
<td>Early successional riparian habitats with a dense shrub layer and an open canopy</td>
<td>Low; while the Project area provides some foraging and nesting habitat, presence is uncommon in this region of California</td>
</tr>
</tbody>
</table>

¹Federal refers to the Federal Endangered Species Act and Bald and Golden Eagle Protection Act (FD = federally delisted, BGEPA = federally protected under the Bald and Golden Eagle Protection Act); State refers to the California Endangered Species Act and the California Fish and Wildlife Code (SD = state delisted, SE = state endangered, SSC = Considered a Species of Special Concern by the State of California, SFP = Fully Protected by the State of California); USFS refers to U.S. Forest Service Sensitive Wildlife Species List for the Eldorado National Forest (FSS = U.S. Forest Service Sensitive).
Bald eagle

Bald eagles are year-round residents and uncommon winter migrants in California. Bald eagles forage and scavenge on large bodies of water with abundant fish, such as estuaries, coastal waters, rivers, large lakes, and reservoirs. They prefer easily approached perches in high snags, large trees, or open rocky slopes. Bald eagles are most likely to nest in very large trees in advanced-successional forests. Nest trees are usually located close to a permanent body of water and must be large enough to accommodate the bald eagle’s large stick nest. Habitat suitability within the general vicinity of the Project is high, as there are readily available thermals and rock ledges with commanding views that provide nesting habitat.

Bald eagles have been documented nesting at Union Valley and Loon Lake reservoirs (DTA 2004c). However, focused surveys conducted in association with the Iowa Hill Pumped-storage Development did not find bald eagles nesting at or near Slab Creek Reservoir (DTA 2005c). The only bald eagles observed in the vicinity of Slab Creek Reservoir were likely solitary non-territorial males, or potentially the same individual, which used the reservoir during the non-breeding season.

Northern goshawk

Northern goshawks are year-round residents in California. The species nests in mature and/or old-growth forests, including within coniferous and mixed conifer-hardwood vegetation types. Preferred stands are those with relatively large trees, high canopy cover, and an open understory (Keane 2008). Nesting typically occurs above 2,500-ft. (762 m) elevation (McGrath et al. 2003). Northern goshawks are adapted to pursue prey in forests, but may also hunt in open habitats (Squires and Reynolds 1997).

Although there is suitable foraging habitat, it is improbable that northern goshawks would nest within the survey area or in the vicinity of the Project due to elevation.

American peregrine falcon

American peregrine falcons, uncommon breeding resident and migrant in California, breed in portions of the Sierra Nevada, and along coastal California (Zeiner et al. 1990b). Peregrine falcons usually nest near water in a depression or scrape made on high cliff ledges, but also nest in human-made structures (e.g., bridges or buildings), and occasionally within abandoned raptor nests in snags or trees (Zeiner et al. 1990b, White et al. 2002). Peregrine falcons capture prey in the air, in a variety of open habitats.

Habitat suitability within the survey area and in the general vicinity of the Project is high, as there are rock ledges in the Project vicinity with commanding views that provide nesting habitat. In addition, ample foraging habitat is available since the Project is in a relatively deep canyon with many small bird species to hunt.
California spotted owl

California spotted owls, year-round residents in California, breed in the southern Cascades, the Sierra Nevada from Burney south, the Tehachapi Mountains, and the coastal range south of Monterey (Gutiérrez et al. 1995). California spotted owls typically occur in older forested habitats at elevations below 3,280 feet (1,000 m). They nest in complex stands with large trees dominated by hardwoods (primarily Quercus [oak] species) with conifer cover increasing with elevation (Gutiérrez et al. 1995). The species also requires some open areas for foraging as it hunts prey on the forest floor in woody debris; the most important food item is the dusky footed woodrat (Neotoma fuscipes) (Gutiérrez et al. 1995).

California spotted owls have been documented on SMUD lands less than one mile (1.6 km) away from the Project site (DTA 2004d). However, although they may visit the vicinity of the Project as transients, they are unlikely to nest or forage in the survey area because it lacks woody debris on the forest floor (habitat for prey) and large snags for nesting.

Black swift

Black swifts occur in California as summer residents and as migrants from April to October. Nesting occurs as early as May and as late as September (Roberson and Collins 2008). Black swifts nest in moist crevices behind or beside permanent or semi-permanent waterfalls in deep canyons, on perpendicular sea cliffs above surf, and in sea caves (Roberson and Collins 2008). This species forages widely over many habitats.

Although nesting habitat for black swifts is limited within the survey area, moderately suitable habitat does occur in the vicinity of the Project. There is a waterfall/cascade complex along a steep gradient of Iowa Canyon Creek approximately 400 feet upstream of the construction site that may provide suitable nesting habitat for this species.

Vaux’s swift

Vaux’s swifts are migratory and summer residents in California. Vaux’s swifts prefer nesting in mature, old-growth redwood or Douglas-fir forests, often near streams or other forest openings (Bull and Collins 2007). They nest predominantly in hollow live trees or snags with cavities large enough to allow for flight (Zeiner et al. 1990b, Hunter 2008). Vaux’s swifts seek primarily insect prey on the wing above the forest canopy, in forest openings such as burn areas, and above streams and rivers (Zeiner et al. 1990b, Bull and Collins 2007).

The likelihood of occurrence for this species is moderate as foraging habitat for Vaux’s swift is abundant in the survey area and nesting habitat is present, although limited, with a few suitably sized snags and trees.
Olive-sided flycatcher

Olive-sided flycatchers are migratory and summer residents in California that typically breed in the Sierra Nevada foothills (CalPIF 2002, Widdowson 2008). Olive-sided flycatchers have been documented in a wide variety of forested habitats in California, including mixed conifer, Douglas-fir, redwood, and montane hardwood-conifer forests (Widdowson 2008). They primarily occur in advanced successional coniferous forests with open canopies, near forest edges or forest openings (e.g., meadows, rivers, harvest units), and with abundant perches (Zeiner et al. 1990b, Altman and Sallabanks 2000, CalPIF 2002, Widdowson 2008). The birds prefer nesting areas near water bodies, potentially due to increased insect abundance in these areas (Altman and Sallabanks 2000). In addition, studies have shown an increase in nesting olive-sided flycatchers with a reduction in forest canopy due to logging operations or fire (CalPIF 2002).

The likelihood for occurrence of the olive-sided flycatcher is moderate as adequate nesting and foraging habitat is present within the survey area and in the vicinity of the Project.

Yellow-breasted chat

Yellow-breasted chats are migrants, and summer residents are found across much of California, breeding mainly in northwestern California and the low- and mid-elevation Sierra Nevada. Yellow-breasted chats can be found in dense thickets of willows or other brushy areas of riparian woodlands (Zeiner et al. 1990b, Ricketts and Kus 2000). The species prefers areas with an open canopy and close proximity to water along streams or wet meadows; however, the preferred understory for nesting sites is thick and often includes a tangle of blackberry and wild grape (Zeiner et al. 1990b, Comrack 2008). A few taller trees are necessary to use as perches for singing (Comrack 2008). This species forages in low, dense riparian shrubland on a variety of spiders, insects, and berries gleaned from vegetation (Zeiner et al. 1990b, Ricketts and Kus 2000).

The likelihood for occurrence within the survey area and in the vicinity of the Project is low. While some foraging and nesting habitat is present, the yellow-breasted chat is uncommon in this region of California.

Other Bird Species

Other bird species that have been observed in the vicinity of the Project area are provided in Table 5.5.1-3.
Table 5.5.1-3. Wildlife species observed or identified by song during 2010 wildlife habitat assessment and bird surveys.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>turkey vulture</td>
<td>Cathartes aura</td>
</tr>
<tr>
<td>mourning dove</td>
<td>Zenaida macroura</td>
</tr>
<tr>
<td>Anna's hummingbird</td>
<td>Calypte anna</td>
</tr>
<tr>
<td>western wood-peewee</td>
<td>Contopus sordidulus</td>
</tr>
<tr>
<td>black phoebe</td>
<td>Sayornis nigricans</td>
</tr>
<tr>
<td>Steller's jay</td>
<td>Cyanocitta stelleri</td>
</tr>
<tr>
<td>common raven</td>
<td>Corvus corax</td>
</tr>
<tr>
<td>tree swallow</td>
<td>Tachycineta bicolor</td>
</tr>
<tr>
<td>violet-green swallow</td>
<td>Tachycineta thalassina</td>
</tr>
<tr>
<td>northern rough-winged swallow</td>
<td>Stelgidopteryx serripennis</td>
</tr>
<tr>
<td>oak titmouse</td>
<td>Baeolophus inornatus</td>
</tr>
<tr>
<td>bushtit</td>
<td>Psaltriparus minimus</td>
</tr>
<tr>
<td>canyon wren</td>
<td>Catherpes mexicanus</td>
</tr>
<tr>
<td>American dipper</td>
<td>Cinclus mexicanus</td>
</tr>
<tr>
<td>American robin</td>
<td>Turdus migratorius</td>
</tr>
<tr>
<td>orange-crowned warbler</td>
<td>Vermivora celata</td>
</tr>
<tr>
<td>spotted towhee</td>
<td>Pipilo maculatus</td>
</tr>
<tr>
<td>California towhee</td>
<td>Pipilo crissalis</td>
</tr>
<tr>
<td>western tanager</td>
<td>Piranga ludoviciana</td>
</tr>
<tr>
<td>black-headed grosbeak</td>
<td>Pheucticus melanocephalus</td>
</tr>
<tr>
<td>lesser goldfinch</td>
<td>Spinus psaltria</td>
</tr>
</tbody>
</table>

5.5.2 Environmental Effects of the Project

The Project is not expected to have significant adverse effects on wildlife. The small (<1 acre), largely open area of the construction site will require the removal of a very small number of mature trees during site clearing. Mature trees will be removed outside the nesting season of bird species. This will essentially eliminate the potential of construction site clearing from having a direct impact on tree-nesting or roosting wildlife. While the habitat-based surveys performed in 2010 indicated a high probability of habitation by pallid and Western mastiff bats, mist net trapping and bat evidence investigations in 2003 in the adit point to the absence of bats using the adit. This 2003 conclusion was confirmed in 2010, when no signs of bat use in the adit were evident. Temperatures in the adit are likely cool throughout the year; therefore, it is unlikely to be used by bats as summer roosting. Outside the adit, removal, or covering up, of portions of the rock face near the new powerhouse has the potential to affect bats roosting in rock crevices.

Because of the high likelihood of occurrence for pallid, spotted, and western mastiff bats, the potential exists for long-term disturbance and/or habitat loss. As a result, SMUD will perform pre-construction studies to estimate the amount and type of suitable roosting habitat, determine the presence/absence of bat species, and presence of existing day, night, or maternity roosts in the Project area (Stillwater Sciences 2012b).
The study area will include the immediate area of the new powerhouse, as well as 0.5 miles downstream and upstream of the adit portal. Field survey techniques, to be approved by the USFS, USFWS, and the CDFW, are expected to include several complementary techniques such as visual inspection of roost surveys at facilities, net and/or trap capture stations, and/or acoustic monitoring. A combination of both passive acoustic and active acoustic monitoring may be used to detect all three of the potentially occurring special-status species.

If the surveys indicate the presence of special-status bats, appropriate avoidance, protection, and/or mitigation measures would be developed, supported by additional analyses as necessary, in consultation with the above-mentioned natural resource agencies.

To minimize the possibility of impacts on breeding wildlife SMUD will perform tree removal after August and before spring within any given year.

Indirect impacts to wildlife could result from construction-related noise, resulting in nest/roost abandonment or failure. Intermittent noise from construction activities could lead to wildlife moving from the immediate area during the two-year construction period. There is sufficient forest habitat in the vicinity of the construction area to accommodate movement of wildlife temporarily displaced by construction noise. As wildlife move away from noisy activities, noise would likely become buffered, thereby reducing its detrimental effect physically, physiologically, and behaviorally.

The potential also exists for electrocution or collision mortality of special-status bird species — particularly raptors — resulting from contact with the proposed powerline poles. To reduce potential for avian mortality, SMUD will comply with current standards by implementing construction design standards for power lines using Avian Protection Plan guidelines (APLIC and USFWS 2005).

5.6 Recreation Resources

5.6.1 Affected Environment

Although the area of the Project is accessible to the public year-round and is fairly close to Placerville, few recreationalists use the reservoir or river. The primary reason for the limited recreational use is the steep terrain of the SFAR canyon. This feature limits both access to the site and the ability to develop recreational opportunities. There are no developed recreational facilities such as campgrounds or picnic areas at either the reservoir or river. Canyon walls are too steep to easily construct facilities or trails along the reservoir perimeter or along the river. A primitive boat launch currently exists at the reservoir and SMUD will add a second boat launch near the eastern end of the reservoir by Year 5 of the new license. Access to the river near the dam is afforded by an old construction road that leads from the terminus of Slab Creek Road to the river margin. This is the only public access to the 8.0-mile Slab Creek Dam Reach except for the
Mosquito Road Bridge, which crosses the river approximately midway through the reach.

The few recreationalists that access the Project area enjoy a variety of activities. Summer surveys conducted in 2002 during UARP relicensing revealed the recreational activities most frequently engaged in by visitors included swimming, fishing (reservoir and river), canoeing/kayaking, hiking, and photography (Table 5.6.1-1). Recreationalists frequently are observed during summer months swimming in the large, deep (16-ft) pool directly below the pedestrian footbridge.

| Table 5.6.1-1. Most important recreation activities identified by visitors to Slab Creek Reservoir, summer 2002. |
|-------------------------------------------------|-------------------------------------------------|
| Activity                                      | Percent of Visitor Identifying Activity as One of Three Most Important. |
| Swimming                                      | 63.0                                            |
| Hiking /Walking                               | 44.0                                            |
| Fishing (Lake or Res.)                        | 41.0                                            |
| Fishing (Stream or River)                     | 41.0                                            |
| Picnicking                                    | 37.0                                            |
| Canoeing/Kayaking                             | 33.0                                            |
| Photography                                   | 26.0                                            |
| Powerboating                                  | 7.0                                             |
| Backpacking                                   | 7.0                                             |
| Bicycling                                     | 4.0                                             |
| PWC Use                                       | 4.0                                             |
| Hunting                                       | 4.0                                             |
| Visiting Cultural/Hist. Sites                 | 0                                               |
| Sailboating                                   | 0                                               |
| Wildlife viewing                              | 0                                               |

In addition to the summer activities identified in 2002, the Slab Creek Dam Reach has a history of greater whitewater boating activity than any other reach in the UARP. First run by whitewater boaters in 1982, it has been run regularly during peak run-off periods and during winter storm, when Slab Creek Dam spills at a volume generally exceeding 500 cfs. The Slab Creek Reach is characterized as a class IV/V run. Because of the Class V designation, only highly skilled boaters can boat in the Slab Creek Dam Reach. Under the new license, whitewater boating flows will be released by SMUD in Wet, Above Normal, and Below Normal water year types. In each of these years, flows ranging between 850 and 1,500 cfs will be released on 6 or 7 weekend days during spring months.

5.6.2 Environmental Effects of the Project

Recreationalists engaged in swimming or waterplay in the large pool below the footbridge will be allowed access to the pool during construction, but may have their swimming/waterplay experience impacted to a degree by the presence of a construction project 400 feet downstream. This disturbance will last for three, possibly four,
summer(s). Recreationalists engaged in fishing below Slab Creek Dam should not be affected by the construction once they move downriver of the construction zone.

When the Project is operational, whitewater boating in the 8-mile Slab Creek Dam Reach will be enhanced. Releasing boating flows through a combination of control points will ensure greater precision in achieving ramping rates and target flow levels. The controlled release will increase boating safety by eliminating the possibility of a large surge of water entering the reach if White Rock Powerhouse were to automatically shut down, or trip. The proposed put-in location and parking area along Slab Creek Road will also facilitate whitewater boating in the reach. Because the proposed minimum dam release of 15-36 cfs is not expected to provide adequate navigability between the put-in and new powerhouse, SMUD will fully open the 24-inch Howell-Bunger valve at the base of Slab Creek Dam during boating flow days. This will provide up to 250 cfs of flow from the put-in to the powerhouse site. SMUD conducted a test release from the existing valve on February 14, 2013. Members of the boating community and BLM were invited to observe the flow. The American Whitewater representative present during the test stated he was satisfied with the resulting 270 cfs flow as providing adequate clearance over boulders to walk an 8-feet-wide by 16-feet-long whitewater raft the 100 yards from the put-in to the powerhouse site.

The release of over 1,000 cfs from the boating release valve at the adit portal has the potential to create a spray that can be dangerous for whitewater boaters negotiating the first major downstream rapid. To minimize this condition, SMUD will design and construct an energy-dissipating structure associated with the valve in consultation with representatives of the boating community. This will include American Whitewater, American River Recreation Association, California Outdoors, and other interested private boaters. The structure will be designed to minimize deleterious effects of water spray on whitewater boaters negotiating rapids adjacent of the facility.

5.7 Cultural Resources

5.7.1 Affected Environment

5.7.1.1 Archaeological Setting

Archaeological research within the Sierra Nevada and lower foothill regions over the past several decades has resulted in numerous proposals that have been developed in attempts to trace cultural and technological change during prehistory.

The Framework for Archaeological Research Management: National Forests of the North-Central Sierra Nevada (Jackson et al. 1994) proposed a tentative cultural chronology and cultural history for the North-Central Sierra Nevada. This chronology for the American River drainage has been further refined through investigations conducted by Tremaine and Jackson (1994 and 1995) and Boyd (1998) and was synthesized by Jackson and Ballard (1999). Given the lack of radiocarbon associations with archaeological deposits within the Sierra Nevada, this latter study used 1,685 obsidian
hydration rind measurements to develop the most current proposed cultural/technological chronology and forms the basis for the following discussion. These data are all from specimens of the Bodie Hills obsidian source and were collected from 124 sites within the South Fork American River drainage.

As Bouey and Basgall (1984) point out, any discussion of trade and obsidian usage requires a holistic approach that includes a consideration of the archaeological context of the source areas and surrounding locales that contain information “affecting and accounting for” patterns within the area of study. A regional discussion is also of value, given that a large portion of the American River drainage consists of higher elevations with cold winter temperatures and deep snow, and that prehistoric usage within these locales would have been seasonal, and peripheral to, other sub-regions, while the Project area lies in the margin of the Central Valley.

In an attempt to unify the various hypothesized cultural periods in California, Fredrickson (1973, 1974, and 1993) proposed an all-encompassing scheme for cultural development, while acknowledging that these general trends may manifest themselves differently and some variation may exist between sub-regions. These general cultural periods (Paleo-Indian, Early, Middle and Late Archaic, and Emergent Periods) are used here in connection with the North-Central Sierra Nevada chronology because of their relevancy to the lower foothill region of the Project in the vicinity of Folsom. The following list of temporal periods for the Sierra Nevada region, including the Project area, is based on the synthesis provided by Jackson and Ballard (1999):

- Late Pleistocene Pattern and Period (>10,000 Before Present [B.P.]);
- Early Holocene Pattern and Period (ca. 10,000–7000 B.P.);
- Archaic Pattern and Period (ca. 7000–3200 B.P.);
- Early and Middle Sierran Patterns (ca. 3200–600 B.P.);
- Early Sierran Period (ca. 3200–1400 B.P.);
- Middle Sierran Period (ca. 1400–600 B.P.); and
- Late Sierran Period (ca. 600–150 B.P., 2.0 less than 1.0 µ).

5.7.1.2 Ethnographic Context

Ethnographically, the Project area is situated within the Nisenan (sometimes referred to as the Southern Maidu) prehistoric sphere of influence. Kroeber (1925) recognized three Nisenan dialects — Northern Hill, Southern Hill, and Valley. The Nisenan territory included the drainages of the Yuba, Bear, and American rivers, and the lower drainages of the Feather River, extending from the crest of the Sierra Nevada to the banks of the Sacramento River. According to Bennyhoff (1961) the southern boundary with the Miwok was probably a few miles south of the American River, bordering a shared area used by both Miwok and Nisenan groups that extended to the Cosumnes River. It appears that while the foothill Nisenan distrusted the valley peoples, the relationship between the Nisenan and Washoe was primarily friendly. Elders recall intergroup
marriage and trade primarily involving the exchange of acorns for fish procured by the Washoe (Wilson 1972).

In the Nisenan territory, several political divisions, constituting tribelets, each had their own respective headmen who lived in the larger villages. However, which of these larger population centers wielded more influence than others is not known, although they were all located in the foothill areas. Hill Nisenan, located near Placerville, formed one such tribelet with strong affiliations with groups along the ridges and lower drainages of the American River (Wilson and Towne 1978). According to Kroeber (1925), the larger villages could have had populations in excess of 500 individuals, although smaller settlements consisting of 15 to 25 people and extended families were more common. In general, more substantial and permanent Nisenan villages were not established on the valley plain between the Sacramento River and the foothills, although this area was used as a rich hunting and gathering ground.

Several village sites are depicted by Wilson and Towne (1978) along the South Fork American River from east of Placerville to a point near the town of Folsom. These are the villages of Tumeli, Koloma, Chapa, Ekelepakan, and Yukulu.

As with most valley and foothill groups, the Nisenan used a wide variety of floral and faunal food sources. The primary staple food was acorn and gathering expeditions to oak groves were organized seasonally, with hunting, fishing, and the gathering of other vegetal foodstuffs occurring throughout the year. The seasonal harvests were often based on communal property and important social behaviors were intricately related to these harvests. Various roots, nuts, wild onion, wild sweet potato, and many varieties of grasses, berries, and fruits were also gathered at various times. Many of these foodstuffs were processed and stored for winter use, although fresh fruits such as various berries, wild plums, grapes, and other native fruits were consumed while they were fresh. Studies within the Project area indicate that Native Americans deliberately burned meadows to increase forage and improve habitat, clear the areas around habitations, kill insects, improve wild seed crops and facilitate travel and hunting (Deal and Alblinger 1998; Deal and Bennett 1996).

The acquisition of faunal species was accomplished through any number of techniques and implements including the bow and arrow, game drives, and decoys. Nets, traps, rodent hooks, and fire were all put to use in hunting small game. Fish could be caught with nets, weirs, gorges, hooks, and harpoons. One technique apparently involved using soaproot and turkey mullein to poison the water so fish could be easily gathered. Freshwater clams and mussels were gathered in the larger watercourses, such as the American River. Other aquatic food sources available to native populations within the Project area would have included fish such as salmon and sturgeon, netted or caught with the aid of weirs.

Reluctance on the part of traditional Nisenan to disclose sensitive resource locations combined with the virtual destruction of Nisenan culture in the 19th century make in-
depth discussions regarding Nisenan spiritual beliefs and practices difficult. However, historic records document a number of important ceremonies, observances, and dances, some of which are still performed today, that were important ceremonies in early historic times.

5.7.1.3 Historic Setting

El Dorado County

The Project area is located in El Dorado County, one of the original 27 counties created when California became a state in 1850. Originally, the county’s boundaries included parts of present-day Amador, Alpine, and Placer Counties. By 1919, the state adopted the current boundary lines that are marked to the east by the state of Nevada and to the west by the city of Sacramento and Placer County. The American and Cosumnes rivers form the county’s northern and southern boundaries. The original county seat was the town of Coloma, but in 1857 it was moved to Placerville (Coy 1973:97–100; Kyle et al. 1990:7).

Gold mining was the predominant industry in El Dorado County for many years. The county lies on a rich vein of ore that extends through several counties on the western slope of the Sierra Nevada. Other mineral products in the region include large deposits of slate, granite, lime, and asbestos, as well as building stones (Phillips and Miller 1915). By the turn of the 20th century, lumbering, livestock raising, and farming had joined mining as the principal industries of the county. Crops included pears, plums, apples, peaches, cherries, oranges, olives, walnuts, wheat, rye, corn, and acres of vineyards. Another industry that gained popularity in El Dorado County was tourism. With the advent of the automobile, visitors increasingly traveled to the Sierra Nevada and Lake Tahoe in the 1910s and 1920s (Phillips and Miller 1915). At present, the county’s economy is based mainly on lumber, mining, agriculture, livestock, manufacturing, and tourism.

Utilities Development in California

The idea of public ownership of utilities dates to the 19th century, when communities grew tired of the lack of cheap and efficient services and tired of the corruption of local private utilities. Santa Cruz was the first California city to form a municipal utility district, by issuing bonds and then purchasing the private company’s facilities. By 1900, approximately 10 cities operated a municipal utility district. However, these early municipal systems were abandoned between 1910 and 1930, and the cities purchased their power from private companies (Williams 1997:248).

Municipal electricity systems gained momentum in the United States after the passage of the Federal Power Act of 1920, which gave municipalities preference over corporations in filing claims for hydroelectric development (Ward 1973:10). In California, however, only the City of Sacramento took advantage of this new law and formed a municipal utility district. Initiatives for public-controlled utilities all but ended
after World War II. By then, private companies were adequately responding to the needs of their expanding customer base (Williams 1997:266–267). Energy needs shifted in the 1970s, and energy conservation became a critical topic. Customers were conserving energy, and products in the home and office and buildings were more frequently designed to use less energy. The environmental movement and the regulations enacted by California made it more difficult for utility companies to construct large power plants. In 1978, the Public Utility Regulatory Policies Act mandated that utilities buy power from independent producers at prices set by state utility commissions. In the latter half of the 20th century, companies were forced to examine alternative means for generating power and smaller scale projects, a trend that has continued into the 21st century (Williams 1997:322).

**Pacific Gas and Electric Company**

Large scale generation and provision of electricity in the Sacramento Valley and Sierra region arguably begins with Pacific Gas and Electric Company (PG&E), which incorporated in San Francisco in 1905. By 1930, it had become one of the state’s largest landowners, one of the nation’s largest hydroelectric producers, and a major supplier of natural gas for home and industry (Los Angeles Times 2001; Williams 1997:115–142).

In the decade after World War II, California’s population grew to nearly 10.5 million people. In 1950, PG&E added more than 125,000 new customers in that year alone (U.S. Census Bureau 2012; PG&E: 1951). The company built new steam plants in San Francisco, Bakersfield, Eureka, and at Moss Landing on Monterey Bay, as well as 14 new hydroelectric powerplants on the Pit, Feather, and Yuba Rivers (PG&E: 1951). The company expanded and remodeled several older facilities and added new substations (Steel 1947:75).

PG&E relied on a “grow and build” strategy for most of its first century and, like the state population, its growth was spectacular at times. This strategy changed in the latter half of the 20th century as the company responded to new governmental regulations. Presently, the company’s focus is on maintaining its system, as well as conserving energy and developing alternative energy sources.

**Sacramento Municipal Utility District**

SMUD was effectively created in 1923 by popular vote of the citizens of Sacramento. In 1921, California Governor William D. Stephens signed the Municipal Utility District Act of 1921 into law, which allowed municipalities to join to form public utility districts. This act, coupled with the Federal Power Act of 1920, further enhanced the opportunity for SMUD’s creation (Ward 1973:10, 13).

When SMUD was formed, its service area encompassed the city of Sacramento and the city of North Sacramento (now part of Sacramento), an area of approximately 75 square miles. SMUD immediately requested cost estimates for the purchase of the existing

New Slab Creek Powerhouse Project – Final Non-capacity License Amendment Application (FNLLA)
electrical systems in the areas that were owned by PG&E and Great Western Power Company (Great Western Power). In 1934, Sacramento voters approved a $12,000,000 bond for SMUD to establish a publicly operated electric utility system (Ward 1973:32). The cost to build a new distribution system was deemed to be too expensive, so SMUD proceeded with efforts to purchase PG&E’s local system through condemnation. The approval of the bond and effort to purchase PG&E’s utility system in SMUD’s service area sparked years 23 years of lawsuits between SMUD and PG&E (Ward 1973:35, 37). During that period, SMUD was forced to purchase electricity from other companies and agencies because it did not produce any power on its own. This was the direct result of the prohibitively high cost to build its own system (SMUD 2012a). Litigation between the two companies ended when the Supreme Court ruled against PG&E, and the company was forced to finally sell its distribution system to SMUD.

The distribution system was antiquated and had not been well maintained by PG&E during the litigious years in the early 20th century. Within the first 10 years of operation, SMUD increased the number of substations and improved the voltage capacity on its lines so it could transmit more power longer distances (Ward 1973:49, 61). Despite the expansion and upgrades, the tremendous population boom in the Sacramento region after World War II strained SMUD’s system. SMUD found itself at the limits of its bonded capacity and did not want to risk a second bond election. One method of financing the system expansion involved applying for funds from the Rural Electrification Administration (REA), an agency created to provide funding to expand electrical systems into unincorporated areas of a state. Between 1948 and 1959, SMUD borrowed $23,239,000 in REA funds to expand electrical service into the agricultural, unincorporated communities of Sacramento County (Ward 1973:51–52).

As part of its expansion programs, SMUD entered into a contract with the U.S. Bureau of Reclamation (Reclamation) in 1954 to receive power from Reclamation’s Central Valley Project (CVP), a federal project that included Shasta Dam, for a maximum of 290,000 kilowatts for a period not to exceed 40 years. This power was delivered using PG&E lines until SMUD could provide its own direct lines to the CVP (Ward 1973:56–57). By the early 1960s, SMUD was serving 170,000 customers in Sacramento County (SMUD 2012b). In 1969, it started construction on a nuclear power plant, Rancho Seco Nuclear Generating Station, in southeastern Sacramento County (Ward 1973:78–79). The plant became operational in 1974, but the plant suffered from continual problems, including a 27-month outage in the late-1980s. In 1989, voters voted to close the plant. SMUD shut down the power plant on June 7, 1989 (SMUD 2012b). In the 1990s, SMUD diversified its power sources and was serving more than 500,000 customers by the end of the 20th century (SMUD 2012b). SMUD continues to enhance its services and explores new options for energy sources.
Upper American River Project

Major hydroelectric systems have been in operation in California since the early 1900s. During the 1910s and 1920s, PG&E undertook a major hydroelectric expansion that included reservoirs, dams and power plants throughout the Sierra Nevada (Williams 1997:182). None of those systems were part of the facilities SMUD inherited.

Based on population estimates, SMUD was expected to reach its maximum 290,000 kilowatts allowed under its contract with the Bureau. In 1955 it entered into a contract to purchase power from PG&E when it exceeded its limits from the CVP (Ward 1973:62). This forced SMUD to explore other sources of hydroelectric power to meet the demands of its expanding customer base.

In the 1920s, SMUD surveyed the Sierra Nevada, particularly Silver Creek, a tributary of the SiFAR. Although SMUD owned the water rights to Silver Creek, the only feasible option to develop sites for hydroelectric power was to work with PG&E and Great Western Power to construct the necessary and expensive dams and reservoirs. SMUD proposed to allow the use of the water by the two companies for either lease or sale, and at the end of a set number of years, SMUD would purchase the facilities back from the two companies. Both companies refused. In the early 1930s, PG&E attempted to negotiate a deal similar to SMUD's previous proposal, but PG&E was not satisfied with the negotiated terms (Ward 1973:20–21).

Every year, state and federal law required SMUD to demonstrate its intention to use and develop the sites on Silver Creek. In 1946, SMUD relinquished its rights to Silver Creek because it was desperately trying to maintain the system it had just acquired and keep up with its customers’ demands. After conducting feasibility studies to develop the upper American River, SMUD filed the necessary permits for Rubicon River and other tributaries of the Middle Fork of the American River and for Silver Creek in 1948. In 1955, SMUD knew that it would soon reach the limit of its contract with Reclamation, so it was forced to enter into a contract to purchase power from PG&E when it exceeded its limits from the CVP. SMUD also proceeded with its plans for an $85,000,000 development project in the Sierra Nevada that would include storage reservoirs, diversion tunnels, and dams (Ward 1973:63–65). SMUD filed an application for the project with the Federal Power Commission on July 28, 1955. It embarked on a media campaign to build support from utility voters to approve the revenue bond needed to finance the project, known as the Upper American River Project (UARP). Voter approval was given in December 1955 (Ward 1973:65–66), and the State Water Rights Board issued the first permits in 1957.

The entire UARP, consisting of 11 dams, six powerhouses, six auxiliary dams and dikes, 24 miles of tunnels, 2 miles of canals, and an 86-mile system of access roads, took 13 years to complete (Ward 1973:74–75). When it was finally completed, the UARP generated power for 250,000 SMUD customers throughout the Sacramento region and was capable of producing 900,000 kilowatt-hours of energy annually (Miller
The UARP provided low-cost electrical power to SMUD customers and continues to do so (Smeloff and Asmus 1997:13). In California, between 1960 and 1971, production from hydroelectric energy doubled, and hydroelectric generating facilities accounted for 30% of the total power output for California (SRI 1973:357). Today, the UARP can produce 1.8 million kilowatt-hours of energy, which can service 180,000 residences throughout Sacramento County (SMUD 2012c).

Dams

Simply defined, a dam is an artificial means of holding back water for storage or control. Dams have evolved from simple earth- and rock-filled structures to colossal concrete structures used in hydroelectric power systems that provide vast amounts of energy to large areas.

19th-Century Dam Design

The dams built in the United States in the early 19th century were small diversion dams. When hydraulic mining was introduced in California, miners constructed rockfill dams to store the water necessary for mining. These dams were inexpensive and easy to construct because the materials were readily available (Jackson 1988:51; Jackson 1995:35). By the late 19th century, engineers moved to machinery and away from horse-drawn wagons and graders to construct dams. This transition made it more efficient and cost effective to build dams for mining, irrigation, and hydroelectric projects (Jackson 1988:51; Jansen 1988:2). Examples of 19th-century dams include the Blue Lake Dam (1870), an earth- and rock-filled dam built by PG&E in Nevada County, and Crocker Dam (1890), an earth-filled dam built by the town of Hillsborough.

20th-Century Dam Design

At the start of the 20th century, there were an estimated 1,600 dams in the United States (Golzé 1977:v). During the early 1900s, the technological advancements made regarding the preparation and use of concrete, including the ability to accurately control the mixing and the introduction of improved cements and processes for cooling, greatly improved dam design and engineering (Jansen 1988:2). During the 1930s, the Works Progress Administration saw dam construction as an impetus to employment, so huge gravity dams were constructed in the western United States, including Bonneville Dam in Oregon and the Grand Coulee Dam in Washington. After World War II, most of the dams constructed in the United States were gravity dams because of the technological advances in earth-moving equipment and concrete conveyance (Jackson 1988:52). The Rubicon and the Buck Island dams, both gravity dams, were constructed in 1963 as part of the UARP. By 1970, approximately 45,000 dams were in service in the United States (Golzé 1977:v). Advancements in science in such areas as seismology, soil mechanics, and seepage analysis have allowed engineers to build larger, more cost-effective, stronger, and more stable structures (Jansen 1988:2, 4–5).
**Dam Typology**

Dams are divided into two categories (diversion and storage) based on their function. Diversion dams are usually small and built for the purpose of diverting water, raising the elevation of a river, and forcing the water into either a canal or flume for transport to another location. Storage dams are relatively large and capture water in a reservoir for long periods of storage. Gates are used to release water from the dam so that the river’s flow is not completely cut off. A spillway is also typically constructed with a storage dam to handle water overflow when the amount of stored water exceeds the reservoir’s capacity (Jackson 1995:13–14). Within these two categories, dams are further distinguished according to their form and materials as embankment and gravity dams.

**Embankment Dams**

Embankment dams are constructed from excavated natural, local materials. Two types of dams are generally defined as embankment dams: earth and rockfill. Earth dams are formed of compacted layers of earth (FEMA 2004:6; Jackson 1995:22). Earth dams are susceptible to erosion and often require the application of riprap to their upstream (inner) slope (Jansen 1988:261). Rockfill dams are built of cobbles, boulders, rock fragments, or quarried rock no large than 3 inches in diameter. These dams can be constructed to large heights and can have steeper slopes (FEMA 2004:7; Jackson 1995:22).

**Gravity Dams**

Gravity dams are built from concrete. They have a hollow interior and rely on their weight for stability (FEMA 2004:6). Gravity dams, such as the Rubicon Dam, are the most common concrete dam in use and are either arched or buttressed (Jansen 1988:466). The alignment of arched dams is curved upstream to spread most of the water load to the abutments (FEMA 2004:5). Arched dams require narrow canyons that have solid bedrock foundations (Jackson 1988:48). Buttressed dams are more suited for wider canyons. The downstream side of these dams is supported by a series of buttresses (Golzé 1977:284; FEMA 2004:6).

**Timber Industry**

Much of the logging in El Dorado County began in the early 1890s with the American River Land & Lumber Company, which eventually became the Michigan-California Lumber Company (Palmer et. al. 1994). A founder of the company arranged a trade with the State of California; land was donated in Folsom for the construction of a prison in exchange for prison labor to build a small dam on the American River, and divert water through a canal to a power generation facility (Folsom Powerhouse), which in turn would supply power to a sawmill. Beginning in 1891, logging operations involved the use of large wagons pulled by oxen to haul the logs to a temporary chute and log flume on the north side of the SFAR, approximately one-quarter mile upstream of the current
Slab Creek Reservoir Dam. A more permanent log chute, approximately 2,900-feet-long was constructed in 1893 at the junction of Slab Creek and SFAR. At the time, this structure was reported to be the longest of its kind (Polkinghorn 1966:15–16).

A small camp, known as Chute Camp, was constructed on the south side of the river immediately opposite the end of the chute, and a small splash dam was located a short distance downriver. The camp served as the base for construction activities (Polkinghorn 1966:12). Chute Camp Road provided access to the camp. This logging operation was never a great success, and the transportation of logs by river to Folsom proved to be a greater challenge than the founders had imagined. In 1900, the El Dorado Lumber Company took over the remaining assets of the bankrupt American River Land & Lumber Company, and established a mill at Piño Grande, which had served as a logging camp in the late 1890s. Instead of floating logs, this operation was entirely based upon the railroad logging of trees on the Georgetown Divide. To bridge the very deeply incised South Fork canyon one of the owners, D. H. McEwen, ordered the construction of a cable system that would transport railroad cars loaded with milled lumber, from one side to the other. Chute Camp served again as a base camp for construction activities. When completed this system was 2,814-feet-long and 1,200-feet-above the bottom of the gorge. Upgrades, with increased capacity, were completed in 1928, and the system operated until destroyed by a fire in 1949.

**Water Development**

Water was needed for mining activities. After the ditch systems had been established, temporary dams were constructed by miners, while more permanent dams for hydroelectric power were built starting in the 1870s. This dam construction progressed, with larger dams and more modern construction methods to keep up with population growth. Hydroelectric development has intensified considerably since then, resulting in a broad network of facilities operated by SMUD, which are a direct result of that 20th century expansion.

5.7.2 Environmental Effects of the Project

A survey of cultural resources in the Area of Project Effects (APE) of the New Slab Creek Powerhouse Project was performed in 2010. The survey, which included historic research, field investigations, and Native American consultation, found two cultural resources located outside, but adjacent to the APE: (1) the historic Chute Camp Road [Forest Service 05-03-56-890]; and (2) a newly identified multi-component resource.

Chute Camp Road was associated with operations of the American River Land & Lumber Company. Portions of Slab Creek Road and Chute Camp Road overlap, and it is the overlapping segments of the two roads that will be used by SMUD’s construction contractors and SMUD operations staff to access the new powerhouse. This segment does not include the unique rock embankments constructed in the 1800s along the non-overlapping segment of Chute Camp Road leading to the Slab Creek Reservoir boat launch. As early as 1920, Chute Camp Road was part of the Eldorado National Forest.
road system and was used for administrative and fire purposes. The heavy equipment trucks required during the construction of Slab Creek Dam damaged large sections of Chute Camp Road and made it unusable. SMUD was required as part of its licensing agreement during the construction, operation and maintenance of the UARP to build a replacement access road (Greeley 1961:1; Leisz 1966). Therefore, SMUD constructed Slab Creek Road and also refurbished the damaged sections of Chute Camp Road (SMUD 1963; Leisz 1965:1—2). The overlapping segment is currently used by SMUD operations staff to access Slab Creek Dam, White Rock Tunnel Gate House, and the existing Slab Creek Powerhouse. It is also used by recreationalists accessing Slab Creek Reservoir and SFAR for spring whitewater boating and summer waterplay/fishing purposes. As originally constructed, Slab Creek Road overlapped with a small section of Chute Camp Road. But, that section was refurbished and modernized for SMUD’s use and is no longer considered part of Chute Camp. Because SMUD will not improve the Chute Camp Road for construction or operational purposes, it will not be adversely affected by the Project. The Project will also not adversely affect Slab Creek Road because that road does not appear to meet any of the four NRHP criteria and is not considered a historic resource.

The newly identified multi-component resource reflects both historic-era and prehistoric land use, and is located in the vicinity of the proposed powerhouse site, but on the opposite riverbank. The prehistoric component consists of bedrock milling features containing one milling slick and 11 mortars. The milling features are located on exposed bedrock that lacks associated sediments or deposits that have the potential to contain additional archaeological deposits. The historic-era component appears to be the remains of the splash dam constructed in early 1890s, which later served as a source for a flume that conveyed water to the PG&E American River Powerhouse at the mouth of Rock Creek, approximately six miles downriver. It may also represent a portion of a flume constructed in 1900 to divert water to the powerhouse at Rock Creek. The extant remains provide little in the way of archaeological information that may be used to reconstruct the methods of construction or maintenance techniques that may have been used in the building of the dam or flume. While the remaining constituents provide limited information on the materials used in construction, the methods of construction include engineered elements, or upgrades that may have been added through time, thereby affecting the integrity of the resource. In summary, the historic-era component does not appear to be eligible for inclusion in the NRHP because of a lack of integrity. The Project will not adversely affect the multi-component resource as it does not appear to meet NRHP criteria and it will also not be disturbed by the construction or operation of the Project.
5.8 Aesthetic Resources

5.8.1 Affected Environment

5.8.1.1 Visual Resources

The Project site lies within the front country landscape zone of the Sierra Nevada Landscape Province. This landscape, which generally encompasses elevations between 1,000 and 3,000 feet, is generally characterized by rolling uplands and steep, rugged river canyons. The landscape is dominated by brush fields that are interspersed with oaks, bull or gray pine, and ponderosa pine. Forested areas are light-colored, open and often sparse. Landscape variety is generally low and there is a low screening ability. The Project will be located at the bottom of the SFAR canyon, a scenic water feature highly valued by El Dorado County and the ENF. The existing landscape immediately adjacent to the Project site is composed of a combination of natural and industrial features, including the river corridor, steep forested hills, Slab Creek Dam, a pedestrian bridge, the old concrete-surfaced construction road with a railroad flatcar bridge crossing Iowa Canyon Creek, and the adit portal.

Although the area receives limited recreational use, the reservoir and adjacent canyon walls are visually sensitive. The primary visitors to the area are boaters who, under the new license requirements, will take advantage of the regular whitewater boating releases. Summer visitors include recreationalists visiting the river corridor for swimming, fishing, and hiking. Views of the surrounding area are confined to the surrounding canyon walls and the river bend ½-mile downstream of the dam.

While the powerhouse site and location of the new bridge across Iowa Canyon Creek lie on SMUD-owned land, the boundary of ENF land is within 200 feet. The river corridor upstream of the powerhouse site has been classified by the ENF with a Visual Quality Objective (VQO) of Retention. A Retention VQO provides for management activities that are not visually evident. Under Retention, activities may only repeat the form, line, color and texture frequently found in the characteristic landscape, but changes in their qualities of size, amount, intensity, direction and pattern should not be evident.

The Land Use Element of the El Dorado County General Plan addresses the County’s visual and scenic quality objectives and policies. The element references policies that specifically require the creation of greenbelts and open space in new development, the creation of community design guidelines for “Rural Centers,” as well as the creation of a scenic corridor ordinance for several potentially visually important areas identified in the General Plan. The Project site is not identified in the General Plan as a potentially visually sensitive area that should be included in the development of the Scenic Corridor Ordinance.
5.8.1.2 **Noise**

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. There are several different ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Noise levels stated in terms of dBA reflect the response of the human ear by filtering out some of the noise in the low and high frequency ranges that the ear does not detect well. The effects of noise on people fall into three general categories:

- Subjective effects of annoyance, nuisance, or dissatisfaction;
- Interference with activities such as speech, sleep, or learning; and
- Physiological effects such as startling and hearing loss.

The effects of noise on wildlife vary if the noise is intermittent or continuous. In addition, wildlife generally responds to noise generated from human activity in one of three ways: avoidance, habituation, or attraction.

The Project will be located in El Dorado County near the communities of Mosquito/Swansboro, Camino, Pollock Pines and the city of Placerville, placing it in an area where a small number of privately-owned residential properties could be affected by a change in noise levels. The Project location is approximately ¼-mile downstream of Slab Creek Dam on the south bank of the SFAR. The site is forested and remote, with no standing structures except the facilities associated with the UARP. Slab Creek Road, a gravel road leading down from the south canyon wall to the Project area, is the only access to the Project site. One home is situation along the road, approximately halfway into the canyon, while others are near the road close its intersection with North Canyon Road on the rim of the canyon. Other homes hug the north canyon rim on the north canyon, perched approximately 1,000 feet above the Project site. Noise sources in the area include periodic logging activities, rushing water during Slab Creek Dam spills, aircraft, light vehicle traffic, insects, birds, and leaves rustling during windy afternoons.

The public health, safety, and noise element of the 2004 El Dorado County General Plan identifies noise levels for rural areas such as the Project site (Table 5.8.1-1). The General Plan also addresses construction noise and establishes significance criteria. Although the tables in the General Plan include limits for nighttime construction noise, the General Plan states that these limits "shall apply to those activities associated with actual construction of a project as long as such construction occurs between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 8:00 a.m. and 5:00 p.m. on weekends, and on federally-recognized holidays.
Table 5.8.1-1. 2004 El Dorado County General Plan construction noise limits.

<table>
<thead>
<tr>
<th>Land Use Designation</th>
<th>Time Period</th>
<th>Noise Level (dB)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$L_{eq}$</td>
<td>$L_{max}$</td>
</tr>
<tr>
<td>All Residential</td>
<td>7 a.m.–7 p.m.</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>7 p.m.–10 p.m.</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>10 p.m.–7 a.m.</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Commercial, Recreation, and Public Facilities</td>
<td>7 a.m.–7 p.m.</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>7 p.m.–7 a.m.</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>Rural Land, Natural Resources, Open Space, and Agricultural Lands</td>
<td>7 a.m.–7 p.m.</td>
<td>65</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>7 p.m.–7 a.m.</td>
<td>60</td>
<td>70</td>
</tr>
</tbody>
</table>

Ambient noise levels were measured in 2004 during UARP/Iowa Hill relicensing at two locations relevant to the Project site: (1) the Slab Creek Reservoir Boat Ramp, an informal reservoir access point approximately one mile upriver of the Project site; and (2) at Cable View Court, a residential street on the north canyon rim (CH2MHILL 2008). The data were developed into time- and energy-averaged descriptors common to noise studies. The equivalent noise level ($L_{eq}$) is the equivalent sound energy that would occur if the noise were constant and continuous over the time period. The 2004 surveys exhibited $L_{eq}$ values in the Project area between 31 and 52 dBA, reflecting quiet or very quiet conditions, generally associated with bird calls — the lowest limit of urban ambient noise (Table 5.8.1-2).

Table 5.8.1-2. Summary of 2004 short-term noise measurements (dBA) at the Slab Creek Reservoir boat ramp and Cable View Court on the north SFAR canyon rim.

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Elapsed Time (minutes)</th>
<th>$L_{eq}$</th>
<th>$L_{10}$</th>
<th>$L_{50}$</th>
<th>$L_{90}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable View Court</td>
<td>8/12/04</td>
<td>10</td>
<td>37</td>
<td>42</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>Slab Reservoir Boat Ramp</td>
<td>8/12/04</td>
<td>10</td>
<td>42</td>
<td>43</td>
<td>36</td>
<td>33</td>
</tr>
<tr>
<td>Slab Reservoir Boat Ramp</td>
<td>8/12/04</td>
<td>11</td>
<td>52</td>
<td>51</td>
<td>37</td>
<td>31</td>
</tr>
<tr>
<td>Slab Reservoir Boat Ramp</td>
<td>8/12/04</td>
<td>10</td>
<td>37</td>
<td>41</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Slab Reservoir Boat Ramp</td>
<td>8/13/04</td>
<td>15</td>
<td>31</td>
<td>32</td>
<td>29</td>
<td>28</td>
</tr>
</tbody>
</table>

5.8.2 Environmental Effects of the Project

5.8.2.1 Visual

The Project will have limited visibility in the SFAR canyon. The steep topography and heavy vegetation preclude a view of the powerhouse from all residences and roads on the surrounding canyon walls as well as from recreationalists boating on Slab Creek Reservoir. The new powerline, coming from the powerhouse up the old construction road to the existing White Rock Tunnel Gate House, will be visible to recreationalists coming to the lake and whitewater boaters launching their watercraft at the proposed put-in. It will also be visible from one residence on the crest of the northern canyon wall, but from a distance of 1,000 vertical feet.
The limited visibility of the powerhouse and powerline minimizes the possibility of a visual impact. SMUD will further minimize the possibility of a visual impact by implementing specific design features and re-vegetation measures, including: (1) surface treatment of all major facility elements with colors and textures in harmony with the surrounding landscape; (2) reshaping and re-vegetating disturbed areas to blend with the surrounding visual characteristic; (3) explore use of native plants species to screen facilities from view to the extent practical; (4) minimizing powerline clearing by using road alignments to site poles as much as possible; and (5) use of non-specular conductors for the powerline. SMUD will confer with USFS visual resource specialists when developing final plans of visual components of the powerhouse design.

A photographic rendering of the powerhouse shown from the pedestrian footbridge and from a point directly across the river demonstrates that with the use of colors and textures matching the surrounding landscape the visual impact will be negligible (Figure 5.8.2-1). The present mixture of natural and industrial features in the Project vicinity will be unchanged with the new powerhouse structure taking the place of the existing adit portal.
Figure 5.8.2-1: A photographic rendering of the powerhouse shown from the pedestrian footbridge (top) and from a point directly across the river (bottom) demonstrates the use of colors and textures to help match to the surrounding landscape.
Another potential visual resource impact is dust plumes from construction traffic along Slab Creek Road. Fugitive dust from construction traffic, if emitted in sufficient quantities, and if adverse weather conditions persist, could impair or degrade existing views. Dust plumes can also become a health issue if residents nearby have respiratory conditions. SMUD will require the construction contractor to implement dust control measures at the construction site and along all dirt roads throughout the two-year construction period. The dust control measures will include the application of dust suppressant at the construction site and along Slab Creek Road. SMUD will also include a provision for re-vegetating disturbed areas to stabilize soils and minimize wind-generated fugitive dust emissions.

Other than during emergency maintenance work, there will be minimal night lighting associated with operation of the Project. Outdoor security lights installed at the powerhouse will be similar in intensity to residential security lights. Lighting will be hooded, directed downward, and restricted to areas required for safety, security, and active maintenance/operation. These measures will reduce the light impact to negligible levels.

The Project does not conflict with El Dorado County’s General Plan as the Project will not preclude the development of community design guidelines in nearby communities, and the Project site was not identified in the General Plan as a potentially visually sensitive area that should be included in the development of the Scenic Corridor Ordinance.

5.8.2.2 Noise

Construction of the Project has the potential to generate noise levels that could be disturbing to residents living in the surrounding area and to recreational visitors to the area below Slab Creek Dam. Construction is expected to last two years and will involve a variety of construction related activities such as rock drilling, blasting, excavation, concrete placement, and movement and placement of fill materials. Noise from these activities could exceed standards established in the local general plan or noise ordinance and could result in a substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project. In areas where the ambient noise levels are in accordance with the standards, as they are shown to be in Table 5.8.1-1, increases that exceed 5 dBA are considered significant.

Since construction activities will be performed during daylight hours, generally within the 7:00 a.m. to 7:00 p.m. time period, the General Plan construction noise limits of 65 dB (L_{eq}) and 75 dB (L_{max}) apply. The likelihood of construction activities exceeding these limits and creating noise that disturbs local residents is minimal, based primarily on the remote location of the Project site and physiographic features of the surrounding area. The Project will be located at the bottom of the SFAR canyon at an elevation of 1,600 ft. The nearest residences are perched on the canyon rim, nearly 1,000 feet above the construction zone. The intervening land between the construction site and the nearest
residences can be characterized as uneven in topography and heavily vegetated. These physiographic features will provide a sound-dampening barrier to nearby residences.

To further decrease the effect of construction noise on local residents, SMUD will implement a variety of noise reduction measures. These will likely include limiting the hours and days of noise-generating construction activities, periodic monitoring of noise generated by construction activities, proper maintenance of construction equipment to reduce noise, and establishing a community response program to allow the public to inform SMUD of any unusually annoying noise events and establish protocols for responding to such events.

Noise associated with project-related transportation of workers and equipment will be minimized by a series of measures SMUD will implement during construction. The small number of vanpool roundtrips (3-5 per day) will not create significant traffic noise. However, the transportation of equipment and supplies (up to five delivery and/or large trucks accessing the Project site daily) has the potential to create more noise than occurs currently, possibly disturbing residents along the transportation route. To minimize heavy truck noise SMUD will: (1) require all vehicles to undergo regular maintenance, in particular muffler maintenance; (2) limit speeds on Slab Creek Road to 20 mph or less; (3) limit equipment/materials transportation to within 9:00 a.m. and 2:00 p.m. on weekdays; and (4) limit idling for vehicles.

5.9 Land Use and Socioeconomic Resources

5.9.1 Affected Environment

The Project site is located in El Dorado County, in the rugged Sierra Nevada between the southern shore of Lake Tahoe and Sacramento. El Dorado County is at the heart of California’s Gold Rush country, often called the “Mother Lode”. Folsom Lake and rolling foothills are on its western border with Sacramento County. El Dorado County is just 30 miles east of Sacramento, California’s state capitol, and only 40 miles west of Carson City, Nevada’s state capitol. San Francisco lies 125 miles to the west and Reno is 50 miles to the northeast.

5.9.1.1 Land Use

Land uses immediately adjacent to the Project site are generally limited by steep topography. Much of the surrounding area is undeveloped open space, with conifer and oak trees dominating the vegetative cover. As such, the primary land uses directly adjacent to the site are hydroelectric generation and limited dispersed recreation. However, rural (sparse residential) development occurs within areas to the north and south of the site, the closest of which occurs along the canyon rims. The Project site is located approximately 8 miles from Highway 50. This area is known as “Apple Hill”, and contains numerous apple orchards, Christmas tree farms, and wineries that include produce markets and gift shops that support a viable regional tourism industry.
As discussed in Section 5.6.1, recreation in the vicinity of the Project area is sparse due to its remote location and the steep topography. There are currently no developed recreation facilities at Slab Creek Reservoir; however, under the new license recreation is expected to increase at the reservoir and the Project site. Reservoir recreation likely will increase above current levels as a result of improved access at two locations: (1) at the existing primitive boat launch near the dam; and (2) near the eastern end of the reservoir. River-based recreation is also expected to increase under the new license, with new releases of whitewater boating flows into the Slab Creek Dam Reach.

5.9.1.2 Socioeconomics

The closest community to the Project site is the town of Camino. Camino was established as a mill town in 1858 and was originally known as Seven Mile. It is located along U.S. 50 between Placerville to the west and Pollock Pines to the east. The highway and several rural roads link the developed areas of the community. Most of the developed area is north of the highway along Carson Road and the rural roads that extend near the Project area.

The historic core of Camino includes a small cluster of retail and service establishments just east of the Carson Road/Snow Road intersection. These shops and services serve primarily the local residents rather than visitors to the area. Sierra Pacific Industries (SPI) owns a lumber mill and administrative offices in Camino; the currently shuttered SPI mill facilities dominate land ownership along Carson Road in Camino.

In the area surrounding the Project site, agriculture and tourism prevail. The area is known as Apple Hill and consists of orchards and vineyards located primarily between Placerville and Pollock Pines on the north side of U.S. 50. Apple Hill was started by the Apple Hill Growers Association. Their concept was for growers to sell their products directly to buyers with no middleman. The area also provides opportunities for picnicking, hiking, and scenic driving. Many of the Apple Hill businesses are open year-round (7 days per week); however, the official season is from Labor Day to Christmas Eve each year. The Apple Hill Growers Association estimates that 500,000 people visit the Apple Hill growers each year (AHGA 2004).

There are three elementary school districts and one high school district serving the area around the Project area. All three of the elementary school districts are feeder districts into the El Dorado Union High School District. The school district runs four bus routes, with buses operating between 7:00 a.m. and 8:00 a.m., between 3:00 p.m. and 4:00 p.m. Kindergarten classes are from 9:00 a.m. to 2:00 p.m., with buses running from 7:45 to 8:45 in the morning and 2:10 to 3:10 in the afternoon. In the Project vicinity, the buses operate on Snows Road, Carson Road, Larsen Drive, and North Canyon Road. The buses stop along the road to pick up and drop off students near their homes.
Road Use and Traffic Characteristics

Access to the Project construction site requires use of county roads that transverse areas of relatively flat terrain with clustered and scattered residences, and the Apple Hill foothill region. Although the Project facilities would not directly affect these land uses, Project construction, equipment installation, and Project operations would require the use of area roadways by construction-related and other vehicles.

El Dorado County’s transportation system is primarily focused on highway facilities. Most in-county travel is in automobiles, because low-density development patterns have limited the viability of facilities or services related to transit, bicycles, and pedestrians. From Highway 50, the primary county roadways serving the Project area include Carson Road, Larsen Drive, and North Canyon Road. Traffic volumes along various segments of these roads were developed for October and November of 2007 as part of a transportation routing study performed for the Iowa Hill Pumped-storage Project (CH2MHILL 2008). Results of this study demonstrate a wide range of traffic volumes along these roads, depending on road segment and day of the week (Table 5.9.1-1).

<table>
<thead>
<tr>
<th>Roadway</th>
<th>From</th>
<th>To</th>
<th>Source</th>
<th>Average Daily Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Weekday</td>
</tr>
<tr>
<td>Carson Road</td>
<td>Jacquier Road</td>
<td>N. Canyon Road</td>
<td>CH2M HILL</td>
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</tr>
<tr>
<td>Carson Road</td>
<td>N. Canyon Road</td>
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<td>EDCDOT</td>
<td>2,946</td>
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<td>Carson Road</td>
<td>Slab Creek Road</td>
<td>EDCDOT</td>
<td>1,357</td>
</tr>
<tr>
<td>Slab Creek Road</td>
<td>N. Canyon Road</td>
<td>Slab Creek Dam</td>
<td>CH2M HILL</td>
<td>37</td>
</tr>
<tr>
<td>Carson Road</td>
<td>Barkley Road</td>
<td>Larsen Drive</td>
<td>EDCDOT</td>
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<tr>
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<td>Carson Road</td>
<td>Barkley Road</td>
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<td>616</td>
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<td>Larsen Drive</td>
<td>Cable Road</td>
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<tr>
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<td>US 50 intersection</td>
<td>Barkley Road</td>
<td>CH2M HILL</td>
<td>3,681</td>
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</table>


In the Project area, there are two connections from U.S. 50 to Carson Road: a non-signaled, at-grade intersection between Placerville and Camino (designated the “old highway” intersection in this document, and denoted as “Junction Old Highway” by Caltrans) and a grade-separated interchange near central Camino area (east Camino interchange).
Carson Road is a two-lane, east-west roadway. It is classified as a rural minor arterial. Carson Road extends from Camino to Placerville and runs parallel to U.S. 50 for most of its length. It has unimproved shoulder on both sides of the road. Larsen Drive is a two-lane, rural local collector that runs generally north-south between North Canyon Road and Carson Road. North of North Canyon Road, Larsen Drive becomes an east-west road and is a minor rural collector. It has unimproved shoulders on both sides of the road. North Canyon Road is a two-lane north-south rural local collector between Placerville and Camino. It has unimproved shoulders on both sides of the road.

Slab Creek Dam Road, off of North Canyon Road, is the access road to the Slab Creek Dam Reservoir and the Project area. It is a gravel road with varying roadway width and no shoulder. The old Slab Creek Dam construction road is a short, one-lane, concrete-based road from the terminus of Slab Creek Dam Road to the banks of Iowa Canyon Creek. Access to this road is restricted to SMUD vehicles. Some of the roads leading to the Project construction site currently have one or more physical characteristics that are considered unsafe, such as sharp turns, narrow widths, or deteriorated pavement, gravel, or dirt (CH2MHILL 2008).

**Law Enforcement and Emergency Response**

The proposed New Slab Creek Powerhouse will be located within the service area of the El Dorado County Sheriff’s Office (Sheriff’s Office). The Sheriff’s Office provides law enforcement services to the unincorporated areas of El Dorado County, (i.e., the whole county with the exception of the cities of Placerville and South Lake Tahoe). The Sheriff’s Office has one deputy assigned to each of the five service areas (called zones) within the county. The Sheriff’s Office has two main offices: one in Placerville and the other in South Lake Tahoe. The Project area is within Zone 5, which is patrolled by one Deputy Sheriff (Stewart, S. 2004). Because the Project area is so remote and sparsely populated, it does not currently require additional law enforcement resources.

El Dorado County has a “Fire-based EMS system,” which means that the fire departments coordinate the emergency response including emergency medical service, and thus firefighters are also trained as paramedics. The funding and equipment are provided through a Joint Powers Authority (JPA). This JPA is composed of the County Fire Departments, the EMS Agency office, and the County Health Department.

Emergency response in El Dorado County is coordinated through the Standardized Emergency Management System (SEMS). SEMS is the system required by California Government Code §8607(a) for managing response to multi-agency and multi-jurisdiction emergencies in California. Under the SEMS and the Incident Command System (ICS), which is part of SEMS, emergency responses are routed through the Primary County Call Center (also known as PSAP), which is located in Placerville. In addition to the PSAP Dispatch Center, there is a Fire Dispatch Center located in Camino that handles calls for fire and medical emergencies.
The Dispatch Center notifies the appropriate agencies to respond to the emergency. The appropriate agencies include those that have the capability to deal with the emergency and those that may have jurisdictional authority. Under SEMS, all responding agencies go into Unified Command, where one agency is in control and coordinates the efforts of all the other responding agencies. The agency with control under the Unified Command is determined by the type of emergency.

Fire Protection

Two primary characteristics of a given landscape define fire potential: fire risk and fire threat. Fire risk is defined as the probability of a fire starting within a given area, while fire threat is the probability of a fire spreading from a fire start, given land use practices (e.g., brush clearing) related to fuel loading. Risk values are calculated based on the historical number of fire starts, number of years of historical information, and number of acres involved. While fire risk assessments have not been performed for SFAR canyon at the proposed powerhouse site, studies conducted during UARP/Iowa Hill relicensing identified the area paralleling the White Rock-Camino powerline as severe fire risk due to proximity to residential areas and Highway 50, both sources of fire starts (DTA and CRS 2004). The risk of a fire start within two miles of this right-of-way segment was between three and 19 times the risk associated with other UARP powerline segments more distant from communities. The same segment of powerline was classified as a moderate fire threat.

Although the proposed Project will be located primarily on SMUD-owned property, the powerline will cross land within the ENF. As such, the Project is within the jurisdiction of both the El Dorado County Fire District (EDCFD) and the USFS, and the California Department of Forestry and Fire Protection (CalFire). Both of these agencies have fire prevention and suppression capabilities. The EDCFD is the local agency that provides fire suppression to portions of the Project site lying outside the ENF; however the EDCFD is responsible for protecting structures rather than wildland areas. The EDCFD has a total of nine stations that serve El Dorado County. Most stations are staffed by trained firefighters who work in crews of two or four. The Project site is within the service territory of Station No. 21, which is located in Camino and serves as the administrative headquarters for the EDCFD and thus is home to the Fire Chief and staff. Station 21 is staffed at all times by an Engine Company consisting of one Captain-EMT or Captain-Paramedic and one Firefighter-EMT or Firefighter-Paramedic.

The responsibility for protecting the Project site from wildland fires resides with the CalFire as it is classified as SRA or State Responsibility Area. Adjacent areas that are owned by the USFS are also protected by CalFire under a mutual aid agreement between the two agencies.
5.9.2 Environmental Effects of the Project

5.9.2.1 Land Use

The primary potential effect of the Project on land use is in converting a small parcel of land from vegetation management for wildlife habitat to powerline vegetation clearing. The parcel along the proposed powerline route lies partly on SMUD-owned land and partly on USFS land. SMUD voluntarily complies with California Public Utility Commission (CPUC) rules and regulations regarding power line clearances (General Order 95). SMUD’s vegetation management program guides management of vegetation within the powerline right of way (ROW). The purpose of the plan is to set forth management direction to maintain an adequate distance between overhead powerlines and vegetation within the ROW.

As the Project powerline will primarily follow existing roads, limited ROW clearing will be required. However, in a few instances the powerline route may pass through natural vegetation. The powerline ROW for the Project shows the landscape consisting primarily of *Quercus wislizeni* Woodland Alliance and *Pseudotsuga menziesii* Forest Alliance. Powerline clearing on steep terrain is performed primarily by mechanical means, such as hand cutting and limited bulldozing. On USFS land, the ENF has authorized SMUD to use ENF-approved herbicides in addition to mechanical treatment within the ROW. Herbicides allow for selective treatment of vegetation where undesirable plants species, such as exotics or noxious weeds, are selectively treated and desirable species, such as low-growing trees and shrubs that provide wildlife habitat or food for foraging, are preserved. The limited vegetation clearing along the powerline will not alter the existing land uses engaged in by the USFS.

5.9.2.2 Socioeconomics

*Road Use and Traffic Characteristics*

Construction of the Project has the potential to increase traffic on the roads of Camino exceeding existing traffic load and capacity. Increases in traffic could result in safety risks for bicyclists, pedestrians, and school-age children walking to and from bus stops. Truck traffic transporting construction materials along Camino roads has the potential to increase hazards due to existing roadway design features such as sharp curves or dangerous intersections.

Potential impacts will be minimized by the implementation of a variety of construction management procedures under a Slab Powerhouse Construction Transportation Plan. A major component of SMUD’s construction plan is the use of an offsite staging area. The available space at the construction site is inadequate to accommodate parking for the 50 construction worker vehicles that will arrive during the peak construction period. Space is similarly limited along the roads of Camino. Construction worker vehicles parked along local roads and in the town of Camino would result in parking impacts for those who currently park there. In addition, between Labor Day and Christmas Eve
each year, the annual apple harvest event known as Apple Hill attracts approximately 500,000 visitors to the Camino area, creating an even greater parking challenge along the roads of Camino. Offsite queuing at a staging area will lessen the impact of additional vehicle traffic by serving as a park-and-ride location for the construction workers, and a staging location for materials and equipment transported to the construction sites.

Construction workers, which will peak at approximately 50 persons, will park their vehicles at the staging area and travel to and from the Project site in carpools or vanpools. Vanpool drivers will be trained with regard to the location of school bus stops and the timing of student drop-offs. Thus, the total number of vanpool roundtrips traveling Camino roads during peak construction will be 5 or 6 per day. The offsite staging area for workers and delivery trucks will lessen the impact associated with Project construction on parking along Camino roads.

SMUD will schedule the construction workday to avoid periods of peak traffic hours. Most of the morning construction worker traffic will occur between 5:30 a.m. and 6:30 a.m., and most of the afternoon traffic will occur between 3:30 p.m. and 4:30 p.m., which are outside the normal business commuting hours.

Limiting the majority of construction work to weekdays will keep construction traffic off Camino area roads on the weekends when traffic volumes increase, particularly in fall and early winter due to Apple Hill tourism. Up to five delivery and/or large trucks are expected to be accessing the Project sites daily during the peak construction period. Most equipment/material deliveries and large truck traffic associated with Project construction will occur between 9:00 a.m. and 2:00 p.m., a non-peak hour traffic period, which is also outside of the hours that school bus traffic would occur.

All construction traffic will comply with applicable laws, ordinances, regulations, and standards related to traffic issues. SMUD will, for example, receive necessary permits for use of El Dorado County roads and establish a compliance program. The compliance program will largely fall within SMUD’s mandatory driver awareness program. The program will include notification of the prescribed transportation route to the Project site, allowable parking areas, queuing protocols, allowable delivery periods, and measures to avoiding conflicts with other vehicles, bicycles, and pedestrians (i.e., sharing the road). The program will also focus on issues such as speed limits and regulatory requirements for transporting wide loads and hazardous substances such as explosives. Public notification measures will also be included in the training program.

Improvement to roads that comprise the transportation route to the construction sites will be required prior to the start of construction to allow passage of construction vehicles and equipment. Most of the improvements will focus on the road leading from the terminus of Slab Creek Road to the construction site. As this steep road is gated and unavailable to the public, the improvements will not impact local area traffic. Other roads may require improvements or the placement of traffic control procedures,
measures, or devices. SMUD will consult with the El Dorado County Department of Transportation (EDCDOT) and the USFS regarding improvements to roads, traffic control needs, and employee road hazard awareness training. The consultation will document the existing condition of the roads and the actions needed for Project construction. Roads used for Project construction will be left in a condition equal to or superior to their existing condition, with necessary maintenance occurring throughout the two-year construction period. All temporary signs, lighting, and traffic control devices used during construction will conform to applicable agency standards. These steps will reduce existing and potential roadway safety hazards.

Overall, adding construction traffic to Camino roads used by residents and/or businesses will not adversely impact traffic congestion or safety on Camino roads. Because the traffic increases are minor and will not be permanent, they will not conflict with existing or future policies, plans, or programs regarding alternative transportation methods. This assessment is based on the generally low level of traffic increases that will result from construction activities, coupled with specific provisions in SMUD’s construction plan designed to ease traffic conflicts, such as use of carpools and/or vanpools, offsite queuing, and traffic scheduling.

Law Enforcement and Emergency Response

The New Slab Creek Powerhouse Project will not impact law enforcement and emergency response services in El Dorado County.

Fire Protection

Construction and operation of the Project has the potential to expose people and structures to risk of loss, injury, or death involving wildland fires. The magnitude of risk is directly related to a variety of factors, including: (1) consistency with state and federal agency regulations; (2) fire risk, the probability of fire from construction/maintenance activities; (3) fire suppression efforts hampered by construction activities; and (4) evacuation safety. SMUD will manage the overall risk by maintaining full consistency with regulations and minimizing the likelihood of occurrence of each factor.

The construction plan for the Project will contain a fire prevention component consistent with all Federal, State, and Local regulations regarding fire protection related issues such as fuels management, smoking, and use of flammable materials. SMUD will incorporate into the construction plan the California Forest Practice Rules to reduce fire hazards, and will eliminate any inconsistencies with fire protection regulations. To ensure consistency, SMUD will submit the construction plan for review and approval by state, Federal, and local fire agencies. Importantly, SMUD will also include a specific provision in the construction plan for using the USFS Project Activity Level (PAL) system, which incorporates specific criteria related to fire threat. Each workday will begin with a review of limitations and requirements of the PAL system throughout the Fire Precautionary Period, also known as the fire season, defined as May 1 to December 1.

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Once construction is complete, SMUD will modify the Fire Prevention and Response Plan prepared for the UARP to incorporate the Project. This plan will also ensure compliance with the Forest Practice Rules during Project operation and maintenance.

Fire risk will be managed throughout the construction period to absolutely minimize the chance of a fire start. This risk factor is highest at the inception of construction when the site is cleared. During this time, trees and brush will be cut, moved to a central staging point or landing, and either removed as woody material and/or in chip form, or burned. The total volume of vegetative matter removed will be small given the estimated ½-acre size of the construction zone. If cleared vegetation is burned, it will be performed pursuant to a permit issued by the USFS and/or Cal Fire, and will occur outside the fire weather season. SMUD will have equipment and personnel on site to ensure complete combustion of burn piles and prevent escapes.

During the balance of the construction period, SMUD will also implement a number of measures to reduce fire risk. These will include: (1) protective measures to implement when operating mechanical equipment on the construction site and while driving to and from the work sites; (2) measures for the storage and handling of explosive and/or flammable materials; (3) measures for construction site firefighting; (4) fire safety awareness training as part of the employee environmental awareness program; (5) emergency procedures including notification and evacuation procedures and routes; (6) prohibitions against smoking outside of designated areas; and (7) implementation of an on-site water supply system to stop fires from spreading.

There is a possibility for additional fire starts stemming from operation and maintenance of the powerline constructed for the Project. SMUD will implement the provisions of the UARP Fire Prevention and Response Plan to reduce the operation-related impacts to a negligible level.

Fires suppression and emergency evacuation at the Project will not be hampered by the construction or operation of the Project. Access to the construction site by emergency vehicles will not be hampered by construction activities. The existing access from Camino roads is via Slab Creek Road, a narrow single-lane gravel road with occasional turnouts. The road is currently adequate for accessing the site by most firefighting equipment that would be used for wildland firefighting.

The impact of construction worker evacuation on emergency vehicle access into Camino residential areas and on the evacuation of residents from the neighborhoods during a fire emergency will be negligible. Due to space limitations at the construction site, a small number of construction vehicles (3 or 5 vans) will be accessing the site in the morning and leaving it at the end of the construction workday. This number of vehicles will not cause traffic congestion to the point it would affect an emergency evacuation of the area if one is required. SMUD will not evacuate large vehicles or equipment from the construction site during a fire emergency.
After Project construction is complete, no impact on emergency access or evacuation of the area is expected due to the 1-2 vehicle trips per day required for transporting Project operation staff that will perform maintenance of Project facilities.
EXHIBIT F

6.0 DESIGN DRAWINGS

SMUD has prepared this Exhibit F as part of its application for a license amendment from FERC for the UARP, FERC Project No. P-2101. The exhibit provides design drawings of proposed facilities that comprise the New Slab Creek Powerhouse Project. These design drawings for the proposed powerhouse and boating flow release valve are preliminary in nature, but are intended to be of sufficient detail for FERC to include in a UARP License Amendment Order authorizing SMUD to proceed with final design. SMUD intends to file final Exhibit F Project design drawings of the New Slab Creek Powerhouse Project for FERC approval prior to commencement of the construction.

General design drawings for proposed facilities and features described in Exhibit A to this license amendment application are provided in the design drawings listed in Table 6.0-1 (Appendix D). These drawings provide plan views, elevations, and sections. All elevation data are in National Geodetic Vertical Datum (NGVD) unless otherwise specified.

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tr>
<td>1</td>
<td>Enlarged Site Plan Option 2 – 1 X 2.68 MW Unit</td>
</tr>
<tr>
<td>2</td>
<td>Site Plan</td>
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<tr>
<td>3</td>
<td>Powerhouse Turbine Floor Plan Option 2 – 1 X 2.68 MW Unit</td>
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<td>7</td>
<td>Penstock Bifurcations and Valve Vault Option 2</td>
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<td>9</td>
<td>Tunnel Portal Entry Details</td>
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<tr>
<td>10</td>
<td>Adit and Tunnel Connection</td>
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In response to FERC’S Docket No. RM02-4 (Order 630), “Rules Regarding Critical Energy Infrastructure Information” (CEII) and in light of heightened national security concerns, SMUD has requested that the Exhibit F design drawings receive privileged treatment under FERC’s regulations at 18 CFR §388.112, and not be released to the public. However, these documents are available for review by resource agencies, Tribes and interested members of the general public during regular business hours (8:00 a.m. - 4:00 p.m., Monday through Thursday) at:
Sacramento Municipal Utility District
6201 S Street
Sacramento CA 95817-1899

Parties wishing to view these drawings in detail should contact SMUD’s License Amendment Coordinator by telephone at (916) 732-6733 to make an appointment.
EXHIBIT G

7.0 GIS DRAWINGS

SMUD has prepared this Exhibit G as part of its application for a license amendment from (FERC for the UARP, FERC Project No. 2101. This exhibit provides a map (Figure 7.0-1) of the proposed 2.64-acre expansion to the UARP FERC Project Boundary to encompass the proposed New Slab Creek Powerhouse and other facilities. Exhibit G maps for the proposed FERC Project Boundary expansion are preliminary in nature, but are intended to be of sufficient detail for FERC to include in a UARP License Amendment Order authorizing SMUD to proceed with final powerhouse design and field survey. SMUD intends to file a final Exhibit G map of the New Slab Creek Powerhouse Project for FERC approval prior to commencement of construction.

Figure 7.0-1 was created using different data layers from SMUD’s UARP GIS database. This database has been developed over the past 15 years, with data acquisition and fine-tuning since 1999 when GIS preparation for UARP relicensing began. All elevation data in this exhibit are in National Geodetic Vertical Datum of 1929 (NGVD29) unless otherwise specified. SMUD facility layers include the FERC Project Boundary, transmission lines and towers, dams, penstocks, canals, tunnels, powerhouses, switchyards, and intake structures. The primary data source for these layers is the original UARP Exhibit L drawings and supplements. Other data sources for SMUD facility layers include SMUD Transmission Line Plan-Profile sheets (for transmission line and tower locations) and orthophotography (powerhouses, switchyards, intake structures).

Supporting base layers for the UARP area include lakes/reservoirs, streams & rivers, roads, public land survey system, and land ownership. The sources of these layers include: (1) USGS 7 ½’ quadrangles; (2) USFS GIS data (land ownership, roads, wilderness boundary); (3) El Dorado County Assessor pages and GIS data (land ownership); and (4) orthophotography (reservoir boundaries, road locations).
Figure 7.0-1: Proposed Project Boundary extension which includes the area for the New Slab Creek Powerhouse Project.
8.0 REFERENCES

AECOM. 2012. Environmental conditions downstream of Slab Creek Dam with regard to the ecology of the alga Didymosphenia geminata and its impact on Benthic macroinvertebrates and fish. Prepared for the Sacramento Municipal Utility District.


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CDFG (California Department of Fish and Game). 2010. California Natural Diversity Database. Electronic database, version 3.1.0. Natural Heritage Division, California Department of Fish and Game, Sacramento, California.


DTA and Stillwater Sciences. 2005c. Sacramento Municipal Utility District, Upper American River Project (FERC Project No. 2101) and Pacific Gas and Electric

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MWH. 2010c. Lower Slab Creek Powerhouse, Task 7: Construction Planning Final Report. Prepared for SMUD.


Western Field Ornithologists, Camarilla, California and California Department of Fish and Game, Sacramento, California.


Additional Cultural References


APPENDIX A

PHOTOS
APPENDIX B

DNLAA COMMENT LETTERS
APPENDIX C

DNLAA COMMENT RESPONSE MATRIX
APPENDIX D

DESIGN DRAWINGS
APPENDIX E

NEW SLAB CREEK POWERHOUSE PROJECT

TECHNICAL REPORTS AND ADDITIONAL INFORMATION

(CD ONLY)

Contents:

- Benthic Macroinvertebrate Surveys in South Fork American River and Lower Iowa Canyon Creek, 2010
- New Slab Creek Powerhouse Project: Delineation of Jurisdictional Waters and Wetlands, Final Report, October 2011
- New Slab Creek Powerhouse Project Draft Bat Study Plan
- Environmental Conditions Downstream of Slab Creek Dam with Regard to the Ecology of the Alga Didymosphenia geminata and Its Impact on Benthic Macroinvertebrates and Fish, Final
- Fisheries Surveys in the South Fork American River Downstream of Slab Creek Dam and Iowa Canyon Creek, 2010
- Surveys for the Foothill Yellow-Legged Frog (Rana boylii) and Western Pond Turtle (Actinemys marmorata) in Lower Iowa Canyon Creek and South Fork American River
- New Slab Creek Powerhouse Project Additional Information Item #1: Tabular and Graphical Representations of Wetted Perimeter of the ¼-mile Reach in 5 cfs increments from 10 cfs to 36 cfs and then 63 cfs
- New Slab Creek Powerhouse Project Additional Information Item #2: Cross-sectional Profiles at Six Representative Sites within the ¼ mile Reach (Plunge pool, High gradient cascade, Deep pool mid and tail-out, and two sites in Low Gradient Run Below)
- New Slab Creek Powerhouse Project Additional Information Item #3: Ten (10) Photographs of the Reach at Various Points under Flows of 10, 20, & 36 cfs
- New Slab Creek Powerhouse Hydro Licensing Environmental Support: Terrestrial Resource Evaluation, Final Report, V2 Updated September 2011
- New Slab Creek Powerhouse Hydro Licensing Environmental Support: Water Temperature Assessment
- Lower Slab Creek Geomorphology Report
- Riparian Vegetation Mapping in the South Fork American River and Lower Iowa Canyon Creek, 2010
APPENDIX F

CULTURAL RESOURCES INVENTORY FOR THE

LOWER SLAB CREEK PROJECT

(NON-PUBLIC)

(CD ONLY)

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