Exhibit E – Environmental Report
CONTENTS

1. ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND PROPOSED MITIGATION ................................................................. 1

1.1 General Description of the Locale ................................................................................................................................. E-1
1.2 Water Quantity and Quality .......................................................................................................................................... E-13
  1.2.1 Environmental Setting ........................................................................................................................................ E-13
  1.2.2 Project Impacts and Mitigation ............................................................................................................................. E-20
1.3 Soils and Geology ............................................................................................................................................................ E-22
  1.3.1 Environmental Setting ........................................................................................................................................ E-22
  1.3.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-43
1.4 Fisheries .......................................................................................................................................................................... E-45
  1.4.1 Environmental Setting/Affected Environment ......................................................................................................... E-46
  1.4.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-49
  1.4.3 Monitoring ............................................................................................................................................................... E-56
1.5 Wildlife and Habitat .......................................................................................................................................................... E-57
  1.5.1 Environmental Setting ........................................................................................................................................ E-58
  1.5.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-62
1.6 Botanical and Wetland Resources ................................................................................................................................. E-64
  1.6.1 Environmental Setting ........................................................................................................................................ E-65
  1.6.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-77
1.7 Historic and Archaeological Resources ......................................................................................................................... E-79
  1.7.1 Area of Potential Effect ........................................................................................................................................ E-80
  1.7.2 Environmental Setting ........................................................................................................................................ E-81
  1.7.3 Identification of Historic and Archaeological Resources ......................................................................................... E-90
  1.7.4 Project Impacts and Proposed Mitigation ............................................................................................................. E-96
1.8 Socioeconomics ............................................................................................................................................................... E-101
  1.8.1 Environmental Setting ........................................................................................................................................ E-101
  1.8.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-102
1.9 Recreational Resources ..................................................................................................................................................... E-103
  1.9.1 Environmental Setting ........................................................................................................................................ E-103
  1.9.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-104
1.10 Scenic and Aesthetic resources .................................................................................................................................. E-105
  1.10.1 Environmental Setting ........................................................................................................................................ E-105
  1.10.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-119
1.11 Land Use ......................................................................................................................................................................... E-120
  1.11.1 Environmental Setting ........................................................................................................................................ E-120
  1.11.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-124
1.12 Threatened, Endangered, and Sensitive Species and Critical Habitats ................................................................. E-125
  1.12.1 Environmental Setting ........................................................................................................................................ E-126
  1.12.2 Project Impacts and Proposed Mitigation ............................................................................................................. E-147
1.13 Project Alternatives .......................................................................................................................................................... E-160
  1.13.1 No Action Alternative ........................................................................................................................................ E-160
1.13.2 Alternatives including the Preferred Alternative ..................................... E-160
1.13.3 Alternatives Considered but Eliminated from Further Analysis .............. E-160

2. CONSULTATION RECORD ............................................................................ E-160

2.1 Summary of Consultation Process ................................................................. E-161
2.1.1 Initial Consultation and Scoping Process .................................................. E-161
2.1.2 Preliminary Permits ................................................................................... E-163
2.1.3 Alternative Licensing Process ................................................................. E-163
2.1.4 License Application Activities 2012 to Present ....................................... E-163

3. REFERENCES .................................................................................................. E-166

APPENDICES

Appendix A – Water Quantity and Quality Technical Study
Appendix B – Salmonid Habitat Assessment for Upper South Fork Battle Creek
Appendix C – Stream Flows and Potential Production of Spring-run Chinook Salmon and Steelhead in the Upper South Fork of Battle Creek, California
Appendix D – Biological Assessment
Appendix E – California Red-legged Frog Site Assessment
Appendix F – Botanical Resources Study Report
Appendix G – Delineation of Wetlands and Other Waters Report
Appendix H – Threatened, Endangered, and Sensitive Wildlife Species Habitat Assessment
Appendix I – Non-confidential Cultural Resources Inventory
Appendix J – Non-confidential Historic Properties Management Plan
Appendix K – Agency Consultation
LIST OF TABLES

Table 1.2-1. SF Battle Creek Ambient Surface Water Quality Data (September 4, 2013) ...... E-15
Table 1.5-1. Habitats within the Survey Area ................................................................. E-58
Table 1.5-2. Common Wildlife Species Observed Within the Survey Area.................... E-60
Table 1.6-1. Vegetation Communities within the Project Area ...................................... E-65
Table 1.6-2. Listed Noxious Weeds Observed within the Project Area ......................... E-72
Table 1.6-3. Summary of Wetlands and Other Waters within the Project Area ............. E-77
Table 1.7-1. Archaeological and Architectural Resources Identified within the Lassen Lodge Hydroelectric Project ................................................................. E-92
Table 1.10-1 Summary of Inventoried Viewpoints .......................................................... E-109
Table 1.11-1. Lassen Lodge Hydroelectric Project Estimated Easement Acreage ........... E-124
Table 1.12-1. ESA Fish Species and Critical Habitat Status within the Project Area ....... E-126
Table 1.12-2 TES Wildlife Species Potentially Occurring Within the Project Area ....... E-130
Table 1.12-3. Special-status Plant Species with Potential to Occur within the Project Area .............................................................................................................. E-142
Table 1.12-4. Summary of the Proposed Condition of the PCEs in the Project area .......... E-151

LIST OF FIGURES

Figure 1.1-1. Project Vicinity and Location .................................................................. E-2
Figure 1.1-2. Project Layout ......................................................................................... E-3
Figure 1.1-3. Detailed Project Layout .......................................................................... E-5
Figure 1.2-1. Average Daily Water Temperatures in SF Battle Creek near the Proposed Powerhouse November 2003-November 2006 ........................................... E-18
Figure 1.2-2. Water Temperatures in SF Battle Creek in September-November 2013 ..... E-19
Figure 1.3-1. Project Area Geology............................................................................ E-25
Figure 1.3-2. Project Area Soils .................................................................................. E-33
Figure 1.4-1. Stream Area Composed by Each Channel Unit Type within the Survey Reach of SF Battle Creek (flow was 13 cfs during the survey) ......................... E-47
Figure 1.4-2. Spawning Area Available in Each Gravel Patch Submerged to Suitable Depth in the Project Reach at Flows of 10, 13, and 15 cfs ...................................... E-51
Figure 1.10-1. Aesthetic Resources – KVA Locations .................................................. E-108
Figure 1.10-2. Key Viewing Area 1 ............................................................................ E-113
Figure 1.10-3. Key Viewing Area 2 ............................................................................ E-114
Figure 1.10-4. Key Viewing Area 3 ............................................................................ E-115
Figure 1.10-5. Key Viewing Area 4 ............................................................................ E-116
Figure 1.10-6. Key Viewing Area 5 ............................................................................ E-117
Figure 1.10-7.  Key Viewing Area 6........................................................................................................ E-118
Figure 1.11-1.  Project Area Land Cover............................................................................................ E-122
Figure 1.11-2.  Project Area Land Ownership..................................................................................... E-123
Figure 1.12-1.  Documented Special Status Plan Species Occurrences within the Vicinity
of the Project Area......................................................................................................................... E-145
# ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>degrees Celsius</td>
</tr>
<tr>
<td>°F</td>
<td>degrees Fahrenheit</td>
</tr>
<tr>
<td>ALP</td>
<td>Alternative Licensing Process</td>
</tr>
<tr>
<td>APE</td>
<td>Area of Potential Effect</td>
</tr>
<tr>
<td>APLIC</td>
<td>Avian Power Line Interaction Committee</td>
</tr>
<tr>
<td>BCSSRP</td>
<td>Battle Creek Salmon and Steelhead Restoration Project</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>BMI</td>
<td>benthic macroinvertebrate</td>
</tr>
<tr>
<td>BMP</td>
<td>best management practice</td>
</tr>
<tr>
<td>Cal-IPC</td>
<td>California Invasive Plant Council</td>
</tr>
<tr>
<td>CCC</td>
<td>Civilian Conservation Corps</td>
</tr>
<tr>
<td>CDF</td>
<td>California Department of Forestry</td>
</tr>
<tr>
<td>CDFA</td>
<td>California Department of Food and Agriculture</td>
</tr>
<tr>
<td>CDFW</td>
<td>California Department of Fish and Wildlife</td>
</tr>
<tr>
<td>CEQA</td>
<td>California Environmental Quality Act</td>
</tr>
<tr>
<td>CESA</td>
<td>California Endangered Species Act</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CRHR</td>
<td>California Register of Historic Resources</td>
</tr>
<tr>
<td>CRMP</td>
<td>Cultural Resources Monitoring Plan</td>
</tr>
<tr>
<td>cfs</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter</td>
</tr>
<tr>
<td>CNPS</td>
<td>California Native Plant Society</td>
</tr>
<tr>
<td>CSBP</td>
<td>California Stream Bioassessment Protocol</td>
</tr>
<tr>
<td>DPS</td>
<td>Distinct Population Segment</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>ESU</td>
<td>Evolutionarily Significant Unit</td>
</tr>
<tr>
<td>FERC</td>
<td>Federal Energy Regulatory Commission</td>
</tr>
<tr>
<td>GLO</td>
<td>General Land Office</td>
</tr>
<tr>
<td>HPMP</td>
<td>Historic Properties Management Plan</td>
</tr>
<tr>
<td>km</td>
<td>kilometer</td>
</tr>
<tr>
<td>kV</td>
<td>kilovolt</td>
</tr>
<tr>
<td>KVA</td>
<td>key viewing area</td>
</tr>
<tr>
<td>LRN</td>
<td>Legislative Route Number</td>
</tr>
<tr>
<td>µmhos/cm</td>
<td>µmhos per centimeter</td>
</tr>
<tr>
<td>m/s</td>
<td>meters per second</td>
</tr>
<tr>
<td>mm</td>
<td>millimeter</td>
</tr>
<tr>
<td>NAHC</td>
<td>Native American Heritage Commission</td>
</tr>
<tr>
<td>NEIC</td>
<td>Northeast Information Center</td>
</tr>
<tr>
<td>NHD</td>
<td>National Hydrography Dataset</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NOAA Fisheries</td>
<td>National Oceanic and Atmospheric Administration, National Marine Fisheries Service</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NSR</td>
<td>North State Resources</td>
</tr>
<tr>
<td>NTU</td>
<td>nephelometric turbidity unit</td>
</tr>
<tr>
<td>NWI</td>
<td>National Wetlands Inventory</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>operation and maintenance</td>
</tr>
<tr>
<td>PCE</td>
<td>primary constituent habitat element</td>
</tr>
<tr>
<td>PG&amp;E</td>
<td>Pacific Gas and Electric Company</td>
</tr>
<tr>
<td>POI</td>
<td>point of interconnection</td>
</tr>
<tr>
<td>Project</td>
<td>Lassen Lodge Hydroelectric Project</td>
</tr>
<tr>
<td>RM</td>
<td>river mile</td>
</tr>
<tr>
<td>ROW</td>
<td>right-of-way</td>
</tr>
<tr>
<td>Rugraw</td>
<td>Rugraw, LLC</td>
</tr>
<tr>
<td>RWQCB</td>
<td>Regional Water Quality Control Board</td>
</tr>
<tr>
<td>SF Battle Creek</td>
<td>South Fork Battle Creek</td>
</tr>
<tr>
<td>SHPO</td>
<td>State Historic Preservation Office</td>
</tr>
<tr>
<td>SPI</td>
<td>Sierra Pacific Industries</td>
</tr>
<tr>
<td>SR</td>
<td>State Route</td>
</tr>
<tr>
<td>SWAMP</td>
<td>Surface Water Ambient Monitoring Program</td>
</tr>
<tr>
<td>SWPPP</td>
<td>Stormwater Pollution Prevention Plan</td>
</tr>
<tr>
<td>SWRCB</td>
<td>State Water Resources Control Board</td>
</tr>
<tr>
<td>TES</td>
<td>Threatened, Endangered, and Sensitive</td>
</tr>
<tr>
<td>TLP</td>
<td>Traditional Licensing Process</td>
</tr>
<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>WSL</td>
<td>water surface level</td>
</tr>
</tbody>
</table>
1. ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND PROPOSED MITIGATION

This Environmental Report was prepared in accordance with the requirements of the Federal Energy Regulatory Commission (FERC) regulations in 18 Code of Federal Regulations (CFR) § 5.18(b). The document includes a discussion of each resource area in the Project Area and a discussion of the environmental setting, project impacts, and mitigation.

Rugraw, LLC (Rugraw or applicant) proposes to construct a small hydroelectric project on private lands that will have a nameplate capacity of 5 megawatts. The purpose of the Lassen Lodge Hydroelectric Project (Project) is to generate electricity through hydropower. The Project elements are primarily located on the south bank of South Fork Battle Creek (SF Battle Creek) between elevations of 3,417 feet and 4,310 feet above mean sea level. Power generated from the Project would be transmitted by a new, approximately 12-mile-long, 60 kilovolt (kV) transmission line ranging in elevation from 3,470 feet at the generation substation climbing up to a maximum elevation of 4,422 feet then down to the low point of the transmission line at an elevation of approximately 2,105 feet where it interconnects with the Pacific Gas and Electric (PG&E) Volta – South Transmission line in the town of Maton, California. The Project is located entirely on private land with the exception of 1.5 mile of the transmission line that is within a county road right-of-way (ROW). The proposed Project facilities include a diversion dam incorporating instream flow bypass channel and fish passage, intake structure, control/fish screen structure, approximately 2.4 miles of pipeline and penstock, transition structure, powerhouse, tailrace, substation, approximately 12 miles of 60 kV transmission line, an electrical switchyard, approximately 0.5 mile of 12 kV station service line to supply the substation and powerhouse with station power and telephone, approximately 0.1 mile of 12 kV station service line to supply station power and telephone for the switchyard, and multipurpose areas.

1.1 GENERAL DESCRIPTION OF THE LOCALE

The Project is located on the upper SF Battle Creek on the western slopes of the Cascade Range approximately 3 miles west of the town of Mineral, an unincorporated community in Tehama County, California (Figure 1.1-1). The upper SF Battle Creek at the Project drains an area of approximately 33 square miles south and west of Lassen Volcanic National Park. The Project is located entirely on private land with the exception of 1.5 miles of the transmission line that is within a county road ROW.

Much of the area within and near the Project has been logged in the past, and much of the private lands traversed by the penstock alignment has been logged heavily, some clear-cut, within the last 10 years. Here, this disturbance by historic and ongoing logging activities has been relatively high, with much soil horizon displacement and barren substrates apparent. Other disturbed habitats are associated with margins of the various existing access roads.

Figure 1.1-2 shows an overview of the Project layout, and Figure 1.1-3 provides the Project layout in greater detail across four sheets.
Figure 1.1-2. Project Layout

Project Features
- Transmission Line
- Station Service/Utility Line
- Penstock/Pipeline
- Project Component

Lassen Lodge Hydroelectric Project
Figure 1.1-3 Detailed Project Layout
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496

Project Features
- Transmission Line
- Station Service/Utility Line
- Penstock/Pipeline
- Access Roads

1 inch = 2,000 feet (printed at 11" x 17")

1:24,000

Miles
1.2 WATER QUANTITY AND QUALITY

This section provides the required information to address water quantity and water quality resources. Since submittal of the draft License Exemption Application in May 2012, the applicant conducted one coordination meeting on September 8, 2013, with the State Water Resources Control Board (SWRCB) staff to discuss potential water quantity and quality issues associated with construction and operation of the proposed project and the Clean Water Act Section 401 Water Quality Certification process. A Water Quantity and Quality Technical Report was prepared for the final License Application and can be found in Appendix A. This section summarizes the baseline information and major findings and conclusions presented in that report.

1.2.1 Environmental Setting

SF Battle Creek at the proposed Project site drains an area of approximately 33 square miles south and west of Lassen Volcanic National Park. Below the town of Mineral, the stream enters a canyon, which deepens until it reaches the confluence with the North Fork Battle Creek near the town of Manton. The upper reaches of SF Battle Creek have historically been used for timber production, hydroelectric power generation, livestock grazing, and recreational activities. The lower reaches of SF Battle Creek are used primarily for hydroelectric power generation, agriculture (stock and irrigation), and recreational activities.

Domestic water supply facilities along the upper reaches of this stream (Mineral area) primarily consist of groundwater wells. The lower reaches of SF Battle Creek are used primarily for agriculture (livestock pasture and crop irrigation) and limited recreation. There are no water users, domestic or otherwise, within the project boundaries. Also, above the diversion site at Battle Creek Meadows in Mineral, the waters of the SF Battle Creek are diverted for irrigation of pasture lands. The California Department of Forestry (CDF) and Sierra Pacific Industries (SPI) have filed Statements of Diversion and Use for fire prevention and suppression. SPI uses the water for dust abatement on logging access roads. Approximately 10 miles downstream of the proposed powerhouse site, Pacific Gas and Electric Company (PG&E) generates electric energy from the waters of SF Battle Creek at their South Powerhouse and Coleman Power Plant, located approximately 2 miles east of the confluence of Battle Creek with the Sacramento River.

The following water quality assessment of baseline conditions in SF Battle Creek is based on several sources of information. These sources include existing information from available state and federal water quality databases, a detailed project-specific benthic macroinvertebrate (BMI) study, and a focused water quality monitoring effort and water temperature monitoring program in fall of 2013 to better understand SF Battle Creek flow and temperature dynamics in the project reach.
Streams in the area and SF Battle Creek commonly have good mineral quality, but at times have experienced high bacteria counts due to the existence of sanitation facilities approximately 3 miles above the Project intake facility. The California Regional Water Quality Control Board (RWQCB), Central Valley District sampled water quality approximately 3 miles upstream near the Mineral sewage pond. The samples taken near the ponds have in the past indicated some coliform and fecal coliform. The Tehama County Sanitation District No. 1 sewage treatment ponds at Mineral have experienced overflows into SF Battle Creek. The District was notified by the California RWQCB that it was in violation of wastewater discharge requirement (Water Resources Control Board Order 77-280). Observations at the ponds indicate that the quality of wastewater is good due to the high infiltration and inflow. However, if pond water were to flow directly into the creek, it would result in increased levels of fecal coliform. Higher levels of fecal coliform in the creek upstream of the ponds indicate that grazing animals in the meadow are most likely the cause of the coliform in the sample. Barring further overflows from the Tehama County Sanitation District No.1 ponds at Mineral, there are no known point sources for pollutants upstream of the Project. Non-point sources include surface runoff from roads, exposed dirt surfaces, and cattle grazing pastures. These sources are most active during the spring and summer, when grazing is heaviest, road-building and logging operations are most active, and snowmelt runoff carries pollutants into the stream.

The California Department of Water Resources has taken 24 samples in SF Battle Creek near Manton, about 14 miles downstream of the Project. These samples showed extremely low levels of chlorides, nitrates, magnesium, potassium, dissolved solids, and hardness. Sedimentation of particulate matter in the streambed of the affected reach of the Project of SF Battle Creek was not noticed due to the high water velocity and low suspended sediment concentration. In general, SF Battle Creek watershed produces surface flows with very high water quality and fairly stable flows from springs from volcanic formations that discharge cold clear water into the stream.

1.2.1.1 Site-Specific Water Quality Sampling

A focused water quality monitoring survey was conducted by the Project applicant in the fall of 2013 to reaffirm and verify the high quality water conditions in SF Battle Creek and to assist in documenting background conditions. Streamflows in SF Battle Creek at the proposed diversion site were approximately 4 to 5 cubic feet per second (cfs) based on the applicant’s stream gage readings. Water samples were collected on September 4, 2013, at two locations in the Project area: 1) the proposed diversion site, and 2) the powerhouse location. Samples were analyzed for general chemistry parameters, general minerals, and drinking water metals. The primary purpose of this sampling was to provide a snapshot of water quality conditions during the typical low-flow fall season.
As shown in Table 1.2-1, SF Battle Creek has calcium magnesium carbonate water with low alkalinity and neutral to slightly basic pH. Electrical conductivity, a general measure of mineral content of a waterbody, was very low at both stations measuring 79 and 82 µmhos per centimeter (µmhos/cm), respectively, at the diversion site and powerhouse. An analysis of heavy metals at both locations revealed none of the 18 regulated drinking water metals were detected. In summary, water quality in SF Battle Creek is considered to be very high quality water with low mineral and nutrient content with little if any direct wastewater discharges.

**Table 1.2-1.** SF Battle Creek Ambient Surface Water Quality Data (September 4, 2013)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>SF Battle Creek @ Diversion Site</th>
<th>SF Battle Creek @ Powerhouse Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Temperature (°C)</td>
<td>16.73</td>
<td>11.61</td>
</tr>
<tr>
<td>Field pH (units)</td>
<td>7.42</td>
<td>7.95</td>
</tr>
<tr>
<td>Field EC (µmhos/cm)</td>
<td>69</td>
<td>63</td>
</tr>
<tr>
<td>Field DO (mg/l)</td>
<td>7.66</td>
<td>6.27</td>
</tr>
<tr>
<td>Turbidity (units)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total Alkalinity (mg/l)</td>
<td>32</td>
<td>39</td>
</tr>
<tr>
<td>Bicarbonate as CaCO₃ (mg/l)</td>
<td>32</td>
<td>39</td>
</tr>
<tr>
<td>Carbonate as CaCO₃ (mg/l)</td>
<td>ND (&lt; 5)</td>
<td>ND (&lt;5)</td>
</tr>
<tr>
<td>Hydroxide (mg/l)</td>
<td>ND (&lt; 5)</td>
<td>ND (&lt;5)</td>
</tr>
<tr>
<td>Chloride (mg/l)</td>
<td>0.56</td>
<td>0.89</td>
</tr>
<tr>
<td>Fluoride (mg/l)</td>
<td>ND (&lt;0.10)</td>
<td>ND (&lt;0.10)</td>
</tr>
<tr>
<td>Nitrate as NO₃</td>
<td>ND (&lt;2.0)</td>
<td>ND (&lt;2.0)</td>
</tr>
<tr>
<td>Sulfate as SO₄</td>
<td>5.1</td>
<td>2.3</td>
</tr>
<tr>
<td>Specific Conductance (µmhos/cm)</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>MBAS</td>
<td>ND (&lt;0.10)</td>
<td>ND (&lt;0.10)</td>
</tr>
<tr>
<td>Calcium (mg/l)</td>
<td>6.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Magnesium (mg/l)</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Potassium (mg/l)</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Sodium (mg/l)</td>
<td>3.2</td>
<td>2.4</td>
</tr>
<tr>
<td>Hardness as CaCO₃</td>
<td>26</td>
<td>26</td>
</tr>
<tr>
<td>PH (units)</td>
<td>7.51</td>
<td>7.57</td>
</tr>
<tr>
<td>Total Dissolved Solids (mg/l)</td>
<td>62</td>
<td>64</td>
</tr>
<tr>
<td>Mercury (µg/l)</td>
<td>ND (&lt;1.0)</td>
<td>ND (&lt;1.0)</td>
</tr>
<tr>
<td>Aluminum (µg/l)</td>
<td>ND (&lt;50)</td>
<td>ND (&lt;50)</td>
</tr>
<tr>
<td>Barium (µg/l)</td>
<td>ND (&lt; 100)</td>
<td>ND (&lt; 100)</td>
</tr>
<tr>
<td>Boron (µg/l)</td>
<td>ND (&lt;100)</td>
<td>ND (&lt;100)</td>
</tr>
<tr>
<td>Beryllium (µg/l)</td>
<td>ND (&lt;1.0)</td>
<td>ND (&lt;1.0)</td>
</tr>
</tbody>
</table>
### Table 1.2-1. SF Battle Creek Ambient Surface Water Quality Data (September 4, 2013) (continued)

<table>
<thead>
<tr>
<th>Constituent</th>
<th>SF Battle Creek @ Diversion Site</th>
<th>SF Battle Creek @ Powerhouse Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper (µg/l)</td>
<td>ND (&lt;50)</td>
<td>ND (&lt;50)</td>
</tr>
<tr>
<td>Iron (µg/l)</td>
<td>ND (&lt;100)</td>
<td>ND (&lt;100)</td>
</tr>
<tr>
<td>Manganese (µg/l)</td>
<td>ND (&lt;20)</td>
<td>ND (&lt;20)</td>
</tr>
<tr>
<td>Zinc (µg/l)</td>
<td>ND (&lt;50)</td>
<td>ND (&lt;50)</td>
</tr>
<tr>
<td>Antimony (µg/l)</td>
<td>ND (&lt;4.0)</td>
<td>ND (&lt;4.0)</td>
</tr>
<tr>
<td>Arsenic (µg/l)</td>
<td>ND (&lt;2.0)</td>
<td>ND (&lt;2.0)</td>
</tr>
<tr>
<td>Cadmium (µg/l)</td>
<td>ND (&lt;1.0)</td>
<td>ND (&lt;1.0)</td>
</tr>
<tr>
<td>Chromium (µg/l)</td>
<td>ND (&lt;10)</td>
<td>ND (&lt;10)</td>
</tr>
<tr>
<td>Lead (µg/l)</td>
<td>ND (&lt;5.0)</td>
<td>ND (&lt;5.0)</td>
</tr>
<tr>
<td>Nickel (µg/l)</td>
<td>ND (&lt;10)</td>
<td>ND (&lt;10)</td>
</tr>
<tr>
<td>Selenium (µg/l)</td>
<td>ND (&lt;5.0)</td>
<td>ND (&lt;5.0)</td>
</tr>
<tr>
<td>Silver (µg/l)</td>
<td>ND (&lt;10)</td>
<td>ND (&lt;10)</td>
</tr>
<tr>
<td>Vanadium (µg/l)</td>
<td>ND (&lt;3.0)</td>
<td>ND (&lt;3.0)</td>
</tr>
<tr>
<td>Thallium (µg/l)</td>
<td>ND (&lt;1.0)</td>
<td>ND (&lt;1.0)</td>
</tr>
</tbody>
</table>

°C – degrees Celsius; mg/l – milligram per liter; µg/l – microgram per liter; ND – no detection
Source: California Laboratory Services Analytical Report to Tetra Tech, Inc. dated 9/13/2013.

### 1.2.1.2 Site-Specific Benthic Macroinvertebrate Sampling

Additional insights into SF Battle Creek water quality conditions were obtained from biological data compiled from a BMI sampling and analysis study prepared by the applicant (ECORP 2010). BMI organisms are aquatic insects that live a portion of their life in the stream and are the primary food source for resident fish and other aquatic organisms. The water quality requirements for the various BMI taxa are well known and can be used along with traditional physical and chemical data to assess water quality conditions. In general, biological monitoring (analysis of fish types, fish density, and BMI organisms and other ecosystem assemblages) can supplement traditional physical and chemical water quality measurements to assess water quality conditions. The primary objective of BMI monitoring is provide biological indicators of aquatic habitat health and functionality to be used in conjunctions with water quality and substrate data to evaluate potential project effects on aquatic habitat.

The SWRCB, California Department of Fish and Wildlife (CDFW), and National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) asked for a BMI bioassessment to be part of the supporting technical studies for the License Application. Both the SWRCB and CDFW requested that the California Stream Bioassessment Protocol (CSBP) be used for this study, which was the preferred rapid bioassessment protocol at

---

1 Formerly California Department of Fish and Game
the time (2003). The two agencies were also interested in determining a baseline index of existing water quality and habitat conditions, as reflected by the quality of the BMI community.

A baseline BMI sampling program was conducted in September 2003 by North State Resources (NSR), following a prescribed Benthic Macroinvertebrate Study Plan using the CSBP developed by CDFW (2002).

Although the Surface Water Ambient Monitoring Program (SWAMP) protocol is currently the preferred method for collecting and processing BMI bioassessment data, it was the consensus of the agency/stakeholder group meeting on November 20, 2007, to proceed with the laboratory processing of these samples using the CSBP protocol. ECORP Consulting Inc. was subsequently contracted by Rugraw to process the BMI samples collected by NSR. Additional discussion regarding the study can be found in Appendix A.

In summary, the results of BMI sampling conducted in SF Battle Creek in September 2003 indicate a robust benthic community, consisting primarily of diverse and abundant intolerant taxa with very few tolerant species (less than 2 percent of the sample for all sites). Overall, the BMI data collected in September 2003 indicate that the portion of SF Battle Creek within the Project reach has a healthy aquatic system. To evaluate the overall condition of the SF Battle Creek benthic community data relative to other west slope Sierra Nevada streams, the Index of Biological Integrity score for SF Battle Creek (based on the 2003 CSBP replicate data) was compared with the Index of Biological Integrity score for the combined west slope Sierra Nevada hydroelectric project data, and was found to be generally among the highest scores in the region. Finally, based upon the high abundance of Ephemeroptera, Plecoptera, and Trichoptera species throughout the entire Project area, there is no indication that the prey base for the existing fish population is limited; it includes a robust and diverse set of taxa.

### 1.2.1.3 Water Temperature

Water temperature is a key water quality metric for assessing biological productivity/health and is important consideration in the hydropower project licensing process. Suitable water temperatures must be maintained to continue to support basin plan beneficial uses such as coldwater fishery. SF Battle Creek headwaters are situated on the western flank of Mount Shasta at an elevation of approximately 8,000 feet and display a typical runoff pattern of western Sierra streams with peak flows during spring snow melt and flows slowly dropping as the summer progresses. However, in the Project reach of SF Battle Creek there are numerous springs located below the powerhouse and just above Panther Grade that provide substantial coldwater inputs into the system year-round.

Water temperature data have been collected by Rugraw for several years in project planning. Daily average water temperature data for SF Battle Creek near the proposed powerhouse from
November 2003 to December 2006 are provided in Figure 1.2-1, which shows that the maximum temperature ranges from 64 to 65 degrees Fahrenheit (°F) and typically occurs in mid to late July. Peak temperatures correlate with the low flow regime of the creek and peak air temperatures in summer. The low temperature regime occurs during the cold winter months when the air temperatures are typically the lowest.

In the fall of 2013, a water temperature monitoring survey was implemented to obtain better insights into temperature dynamics in the project reach of SF Battle Creek during low-flow conditions. On September 4, 2013, eight water temperature probes (HOBO brand thermistors) were installed at the following locations in SF Battle Creek:

- Station 1 – SF Battle Creek at the proposed diversion site (river mile [RM] 23.0),
- Station 2 – SF Battle Creek at Project Powerhouse location,
- Station 3 – SF Battle Creek downstream of the Panther Grade springs (RM 20.6),
- Station 4 – SF Battle Creek above Panther Grade springs near wood duck box (1),
- Station 5 – SF Battle Creek above Panther Grade springs (2),
- Station 6 – SF Battle Creek downstream of Panther Grade springs,
- Station 7 – SF Battle Creek upstream of wooden bridge, and
- Station 8 – SF Battle Creek downstream of wooden bridge.

Figure 1.2-2 presents average hourly temperatures at the Project diversion site and other SF Battle Creek locations. The data provided in this graphic are for the period September 4 to

---

**Figure 1.2-1.** Average Daily Water Temperatures in SF Battle Creek near the Proposed Powerhouse November 2003-November 2006
November 2013. As shown in Figure 1.2-2, water temperatures at the diversion site when streamflows were very low (4 cfs) ranged from 40 to 65°F and displayed a typical diurnal pattern with gradual warming during the daylight hours and slow but gradual decreases in temperature at night with dropping air temperatures.

Source: Cramer Fish Sciences 2013

**Figure 1.2-2.** Water Temperatures in SF Battle Creek in September-November 2013

Water temperatures in SF Battle Creek vary depending upon the stream orientation, location in the creek, and the amount of shade from local topography and flow inputs from side tributaries and groundwater springs. Water temperatures at the proposed Project diversion site (Logger 1 - dark blue line in Figure 1.2-2) displayed the largest diurnal fluctuation with daily water temperature swings of 7 to 8°F. The diversion site and watershed areas upstream of this monitoring location are located in a small alluvial area that is more open and receives more thermal energy during the daytime hours when compared to downstream monitoring stations. However, water temperatures at this location dropped significantly beginning in October during the monitoring period and became significantly colder than downstream locations, most likely due to increased streamflows from a rainfall event and colder air temperatures associated with change in season. Water temperatures downstream of the proposed diversion site at Stations 2, 3, and 4 were generally colder with fewer diurnal fluctuations.
In September, water temperatures downstream of the powerhouse location were generally between 8 and 10°F colder when compared to water temperatures at the diversion site. This change is attributable to the creek flowing through a relatively steep and shaded canyon with little if any inputs from springs or tributaries. However, water temperatures downstream of the powerhouse location and Panther Grade springs at Station 3 and near the wooden Ponderosa Bridge (Stations 7 [light blue] and Station 8 [pink]) show minimal diurnal fluctuations with fairly remarkable uniform water temperatures (between 50 and 51°F) over the monitoring period and are a reflection of the influence of multiple springs at or near the Panther Grade that substantially increase coldwater inflows into this creek segment.

In summary, the existing water temperatures in the Project area reflect the natural seasonality of a western Sierra Nevada stream with warmer water temperatures in summer and colder temperatures in fall and winter. Stream temperatures are influenced by stream orientation, topographic shading, and inflows from numerous coldwater springs below the Project area. The large springs observed near Panther Grade provide a stable flow and fairly constant temperature signal into the lower section of SF Battle Creek below the project, providing optimal conditions for both resident and anadromous fish. Observed water temperatures are suitable to support both coldwater and warmwater fisheries beneficial uses. More detailed discussion of water temperatures as it relates to fish and fish habitat is provided in the federal Biological Assessment (see Appendix D).

1.2.2 Project Impacts and Mitigation

The mechanisms for potential water quality impacts associated with construction and operation of the Project include instream work for construction of the diversion/intake structure, earthmoving and grading associated with pipeline and penstock and powerhouse, and potential flow-related impacts linked to Project operations from streamflow diversion.

1.2.2.1 Construction Impacts

Potential Turbidity and Suspended Solids Effects. Construction and operation of the Project could potentially temporarily impact the ambient turbidity and suspended solids in SF Battle Creek due to instream construction work and soil erosion and transport from graded areas during storm events if measures are not in place to control these factors. The soils at the diversion site are primarily alluvial river sediments with large boulders and gravels with very little fine materials such as clay or organic matter. For example, soils in the forested slope down to the powerhouse location are susceptible to erosion due to steep conditions and from tree removal and cutting and grading required for penstock construction. Battle Creek turbidity levels vary naturally depending upon the time of year, flow conditions, and stream gradient. In general, the ambient turbidity levels are generally less than 5 nephelometric turbidity units (NTUs). Increased turbidity and suspended sediments resulting from Project-related soil
erosion could cause exceedances of state water quality objectives and impacts to resident trout and BMI and other aquatic fauna during a period when ambient turbidity levels are generally quite low. In SF Battle Creek, like most streams that drain the Mt. Lassen region, turbidity naturally varies with flow conditions, with turbidity increasing during significant storm events. During focused water quality sampling in the fall of 2013 when streamflows at the diversion site were very low (4-5 cfs), no turbidity was observed with measured turbidity levels at zero NTU. Turbidity levels were zero to 1 NTU at all stations monitored during the fall sampling event. Significant spring inputs provide cold, cool, clear water to various sections of SF Battle Creek, which tends to increase the flows by an order of magnitude downstream of Panther Grade with very low turbidity conditions.

Construction of the Project is anticipated to occur during the typical dry season in northern California (April through October). The applicant will be required to prepare and implement an erosion control plan and stormwater management plan in compliance with the Tehama County Use Permit. The plan will be prepared by a qualified soil erosion control specialist who will outline specific erosion control best management practices to be used by the construction contractor to ensure soil erosion and transport are kept to the lowest practicable levels during the construction phase. Special attention to erosion control measures in steep topography near the powerhouse location will be needed where the soils are vulnerable to erosion and transport due to the very steep topography. Water quality monitoring will be required as part of the stormwater management plan and CDFW Streambed Alteration Permit to ensure turbidity and suspended solids levels in SF Battle Creek do not exceed allowable levels and that all basin plan beneficial uses are maintained during construction.

1.2.2.2 Operation Impacts

Potential Water Temperature Impacts. As shown in the previous section on baseline temperature conditions, water temperature dynamics of SF Battle Creek show the typical western Sierra stream with seasonal pattern of low flows and cold temperatures in winter and increasing temperatures with the onset of spring and summer. As shown in Figure 1.2-1, water temperatures in the winter are in the mid 30s to low 40s (°F) and increase with the change in seasons. However, SF Battle Creek has substantial spring inflows of very cold, high quality water in numerous locations below the Project reach that provides coldwater refugia for resident trout and other aquatic species. The Project is not expected to significantly change water temperature dynamics in the bypass reach or downstream of the powerhouse because it would maintain instream flows of 13 cfs and large cold springs enter the stream at and below Panther Grade below the Project reach. No impacts to beneficial uses are expected during Project operations.
1.2.2.3 Proposed Mitigation

As described in the Project description, the applicant has included several measures to protect existing water quality conditions in SF Battle Creek and the SWRCB will be recommending measures as conditions as part of the Clean Water Act Section 401 Water Quality Certification regulatory process to ensure that the existing beneficial uses in SF Battle Creek continue to be supported with project implementation. Construction of the diversion dam and intake structure will also require the acquisition of a CDFW Code 1601 Streambed Alteration agreement, which will include various measures to protect aquatic resources and water quality during work in the streambed.

Potential Reductions in Ambient Streamflows and potential impacts to SF Battle Creek Water Quality from Project Operations. The Project is anticipated to divert between 5 cfs and 95 cfs to generate hydropower, primarily during the winter and spring months when peak streamflows in the watershed occur. The Project operations scenario has been optimized to ensure flow and water quality conditions would not be impaired substantially and that all existing beneficial uses would be fully maintained. The proposed diversion of streamflows to generate power during high-flow events and on the tails of these peaking events is not expected to substantially impair water quality conditions and associated beneficial uses due to the very high water quality characteristics of SF Battle Creek and the scheduling of diversions outside of the low-flow season.

1.3 SOILS AND GEOLOGY

1.3.1 Environmental Setting

Geologic Setting. The Project area is located at the southern end of the Cascade Range, a geologic province experiencing active processes of complex folding, faulting, and volcanism. The principal features of the province are a chain of volcanoes that extend roughly south from the Canadian Province of British Columbia through the States of Washington and Oregon, and approximately 200 miles (320 kilometers [km]) into northern California. The basement rocks believed to underlay the southern end of the Cascade Range are the late Cretaceous age sedimentary deposits of the Chico Formation. Ashflow tuff breccia of the late Pliocene-age Tuscan Formation covers the deeply eroded basement where it is exposed. Where attitudes are possible in the Chicago and Tuscan Formations, both dip gently west in the vicinity south of the town of Mineral. Mount Shasta, Medicine Lake, and the Lassen Peak form the three long-lived compound volcanic centers in Northern California. The Project is situated on the southwest flank of the Lassen Peak volcanic system, approximately 12 miles (19 km) from Lassen Peak. The most recent activity in the Mount Lassen area commenced in 1914 and ended in 1917. It was an explosive eruption sequence that produced a 19-mile (30-km) mudflow down the northeast
slope, and has been well documented (Loomis 1926; Day and Allen 1926; Williams 1932; Martin and Davis 1982).

Lassen Peak is only one of a cluster of dacitic domes and flows. These formations occurred within the past 250,000 years on the northeast flank of a deeply eroded 500,000-year-old stratovolcano, referred to as either Mount Tehama or the Brokeoff cone. Contemporaneous with the formation of Mount Tehama was another large stratovolcano to the southwest called Mount Maidu (Wilson 1961). Mount Maidu occupied the location of Battle Creek Meadows, near Mineral. Large volumes of andesite, dacite, and rhyolite flowed out of Mount Maidu over 1.5 million years ago, forming the major highlands northwest and southeast of Mineral. The flows were followed by lahars, or hot volcanic debris avalanches that formed into tuff breccia. Depleted, Mount Maidu collapsed and formed the Battle Creek depression, or caldera. After the formation of the caldera, cinder cones and basaltic flows erupted in the vicinity. Cold Creek Butte blocked the river drainage from the depression for a short time. A lake formed and deposited sediments in Battle Creek Meadows until the river eventually eroded through the volcanic dam. Erosion continued rapidly along the less resistant contact of the young basaltic flow with the older Mount Maidu volcanics, until the deeply incised canyon of the SF Battle Creek was formed. Waterfalls developed at the more resistant lava flows.

**Faulting and Seismicity:** There are two zones of regional tectonic activity relative to the Project. One of these is the zone of right lateral shear within the northern Coast Ranges that lie adjacent to the San Andreas fault that represents a wide mobile belt of continuing deformation along the boundary between the North American and the Pacific crustal plates. The second zone is the region of generally east-west crustal extension corresponding to the basin and range, and overlapping the southern Cascade Range province. Along the southwest border with the Cascades, the northern Great Valley province has topography and stratigraphy that are representative of a condition of long-term structural depression. Late Cenozoic structural features include both reverse and normal faults, the prominent flexure known as the Chico Monocline, and several doubly plunging and dome-like folds. Both the Monocline and most, if not all, of the folds are relatively shallow features developed over steeply dipping faults below the valley deposits, and have not been active during the past 10,000 years. North of the Project, the Battle Creek fault has evidence of Quaternary displacement (Harwood et al.1980), but none within the last 40,000 to 50,000 years. The most recent faulting in the region is the minor movement along the Cleveland Hill Fault, along the Foothill Fault trend south of Oroville, which accompanied the 1975 Oroville earthquake sequence.

Several clusters of earthquake epicenters up to approximately magnitude 4.5 on the Richter scale define the seismicity of the southern Cascade Range. Most of the earthquakes in this region probably originate through Basin and Range–style tectonic faulting, but some are clearly associated with young volcanic centers. Earthquakes were reported from the vicinity of Mount
Lassen during the time of the eruptions of 1917, and two events of magnitude 5.0 and 5.5 occurred in 1946 and one event in 1991. The Cascade seismicity involves generally shallow events, occurring at depths to about 7.5 miles (12 km). Low to moderate earthquake-related ground shaking is estimated for the region, approximately VI to VII on the Modified Mercalli Intensity Scale.

Site Geology and Soils. Figure 1.3-1 provides information on the basic geologic units in the project area. The geologic unit data are from the U.S. Geological Survey preliminary integrated databases for the United States - Western States: California, Nevada, Arizona, and Washington, 2005. Figure 1.3-2 identifies the soil units throughout the area. The soils data are from the Natural Resource Conservation Service Web Soil Survey (Soil Survey Geographic database for Tehama County, CA, Survey CA645, 2004.)

The oldest geologic unit in the Project area is the Tuscan succession of tuff-breccia and tuff beds deposited as lahars. Individual clasts of the Tuscan are generally 3 to 6 inches (76 to 152 millimeters [mm]) in longest dimension, and are moderately to well cemented by the tuff matrix with occasional welded fragments. Coasts are generally vesicular and consist predominately of dacite and andesite. The Tuscan unit is the least strong, relatively speaking, of the rock units in the Project area. The soil profile tends to be the thickest over the Tuscan, possibly several feet. The Tuscan soil and tuff matrix are more easily eroded on slopes than the more resistant volcanic clasts. Bold outcrops of more resistant or welded clasts have a “case hardened” appearance. The tuff and ash matrix weathers quickly to a clayey sand. From an engineering standpoint, the bearing strength of the Tuscan is high, as are all the units in the Project area.

The next youngest unit is the Mineral basaltic andesite. The Mineral rocks were erupted from a conduit within the eroded volcanic center at Battle Creek Meadows. This sequence represents the initial volcanic activity of Mount Maidu. The flow rocks are dark gray to black when fresh, and they develop brown crusts upon weathering, principally to clay. The rocks can vary widely and generally require laboratory analysis to distinguish their composition. Lahars of the Mineral basaltic andesite develop distinctive reddish colored clay sand residual soils.
**Figure 1.3-1  Project Area Geology**

LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496

EXHIBIT E  SHEET 1 OF 4

Project Features
- Transmission Line
- Station Service/Utility Line
- Penstock/Pipeline

Geologic Unit Name
- Qv: Quaternary volcanic flow rocks
- Tv: Tertiary volcanic flow rocks
- Tvp: Tertiary pyroclastic and volcanic mudflow deposits
Project Features
- Transmission Line
- Station Service/Utility Line
- Penstock/Pipeline

Geologic Unit Name
- Qv: Quaternary volcanic flow rocks
- Tv: Tertiary volcanic flow rocks
- Tvp: Tertiary pyroclastic and volcanic mudflow deposits

Figure 1.3-1 Project Area Geology
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496

EXHIBIT E  SHEET 3 OF 4
Project Features

- Transmission Line
- Station Service/Utility Line
- Penstock/Pipeline

Soil Unit

- See Soil Legend Sheet
<table>
<thead>
<tr>
<th>Soil Unit</th>
<th>Cb</th>
<th>CdD</th>
<th>CdE</th>
<th>CdF</th>
<th>CeD</th>
<th>CgE</th>
<th>ClF</th>
<th>CnDsh</th>
<th>CoDsh</th>
<th>CvO</th>
<th>CvE</th>
<th>FvO</th>
<th>GnO</th>
<th>GvO</th>
<th>Ink</th>
<th>IkE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chummy soils, 0 to 3 percent slopes</td>
<td>Cohasset loam, 10 to 30 percent slopes</td>
<td>Cohasset loam, 10 to 30 percent slopes</td>
<td>Cohasset loam, 10 to 65 percent slopes</td>
<td>Cohasset gravelly loam, 10 to 50 percent slopes</td>
<td>Cohasset gravelly loam, 10 to 30 percent slopes</td>
<td>Cohasset gravelly loam, 0 to 30 percent slopes</td>
<td>Colluvial land, volcanic rocks</td>
<td>Cohasset stony loam, 0 to 30 percent slopes</td>
<td>Cohasset very rocky loam, moderately deep, 8 to 50 percent slopes</td>
<td>Cone extremely gravelly sandy loam, 10 to 50 percent slopes</td>
<td>Cone extremely gravelly sandy loam, 10 to 50 percent slopes</td>
<td>Forward sandy loam, 10 to 30 percent slopes</td>
<td>Guenoc loam, 10 to 30 percent slopes</td>
<td>Guenoc loam, 10 to 30 percent slopes</td>
<td>Inskip very rocky silt loam, 10 to 30 percent slopes</td>
<td>Inskip very rocky silt loam, 30 to 50 percent slopes</td>
</tr>
</tbody>
</table>
During the late Pleistocene, volcanic activity erupted at innumerable events in the Cascades. Near Mineral, small volcanoes and cinder cones have been built, and intracanyon and flood basalts have erupted, some within the last 1,000 years. Generally, the paths of these basaltic and basaltic andesite lava (Qbc) flows have been controlled by present topographic features. Gray’s Peak and Cold Creek Butte cinder cone are nearby examples. Basaltic flows from Gray’s Peak flowed down Panther Creek nearly to where the Panther Creek joins the SF Battle Creek, west and downstream of the Project.

Blocking the end of SF Battle Creek and tilling the western entrance of Battle Creek Meadows are the flows and cinder cone of Cold Creek Butte. The cone is one of the youngest features in the region and is used as a borrow area along State Route (SR) 36. A long, thick flow of lava was erupting in a westerly direction from Cold Creek Butte along the present stream bed of the SF Battle Creek and canyon for a distance of approximately 5 miles (8 km). The flow rock has an intergranular texture with abundant phenocrysts of olivine. Residual soil is generally lacking or thin, with some thicker organic debris (duff) and slope wash in the lower reaches of the canyon.

Individual flows within the extrusion form resistant cliffs bordering the creek channel. As weathering has progressed along scoriaceous contacts between the individual flows and between jointing, massive blocks of flow rock have fallen into the stream channel. This undercutting and spalling has produced a series of benches paralleling the south slope of the canyon. In the past, loggers pioneering roads into the steep canyon slope have taken advantage of the weak zones that occur at the top and bottom of flow contacts.

Spalling and abundant rockfall slope instability are present on the steep canyon walls, especially the north wall. However, no evidence was observed of deep-seated rotational or translational landsliding. The rockfall that does occur is controlled by the jointing in the flows and undercutting by weathering of weak rock or contacts.

### 1.3.2 Project Impacts and Proposed Mitigation

#### 1.3.2.1 Project Impacts

Hazards and impacts such as active faulting or mineral loss are not present. Relevant hazards and impacts for this site include slope instability, earthquake shaking, volcanic eruption, flooding, and erosion. Loose soil and rock on steep slopes could exert lateral loads on the penstock and foundations located above the ground surface. Failures in the loose soil pushed over the creek slope by construction of logging roads, both at the diversion structure and in the reservoir area, could occur if the soil becomes saturated or undercut. Access road and foundation pad excavations for the powerhouse and penstock could undercut loose soil. Moderate to large earthquakes occurring in the region can cause strong earthquake shaking at the Project site. Ground shaking would tend to be of short duration and high amplitude, or a
“jarring” motion for structures sited on rock. The motion would probably not be a risk to the individual structures above ground.

Volcanic centers are classified into three generalized categories relative to risk:

1. Active – Current activity or within the past 2,000 years.
2. Potentially Active – Known or presumed to be Quaternary in age, but most recent eruption has not been dated as beginning less than 2,000 years.
3. Inactive – there has been no eruption in the past 2 million years (Quaternary).

Lassen Peak is an active center, which has the potential to erupt and affect the site and vicinity. In addition to air-fall and flows, debris, avalanches, and mud flows are potential hazards associated with volcanism that can affect low-lying areas. Flooding during seasonal fluctuations can accelerate erosion around dam abutments and undermine foundations. Debris carried by the flood waters can also damage nearby stream or channel structures. Flooding associated with volcanic activity is also a possibility. Erosion of thin surface soils is possible from drainage and sheet flow along the existing excavations related to logging and road access. There is no evidence of unstable soil conditions or slope instability in the areas of the relocated diversion, pipeline, or powerhouse.

There will be some increases in soil erosion resulting from construction of the Project. After licensing, Rugraw will prepare and implement an erosion control plan as part of the detailed design.

1.3.2.2 Proposed Mitigation

The hazards and impacts associated with the Project will be largely avoided through standard engineering practices. The siting of the individual structures can effectively mitigate any potential instability. The intended construction makes the potential risks due to earthquake shaking small. Foundations and pipe supports will be designed to accommodate any anticipated seismic forces. The risk to life from volcanic activity at this Project is minimal; however, damage to structures is a possibility. Local seismic monitoring of tremors at the seismograph stationed at Lassen Park Headquarters may be included. Construction of debris cleanouts and barriers will aid in reducing the effects of flooding. Periodic inspection and maintenance of the intake structure will insure that flood flows continue past the intake structure with a minimum of damage to the structure. Because the intake structure is solely for diversion, the risks are small to the structure.

The problem of soil erosion would be minimized to the extent possible by limiting surface disturbance to only those areas necessary for construction. Where natural topsoil occurs, it would be salvaged and stockpiled prior to construction, and the soil piles would be stabilized.
Following construction, all areas where natural topsoils were removed that are not occupied by permanent project facilities would be re-graded, have the topsoils replaced, and be seeded with native vegetation to reduce erosion potential. Following receipt of a License, Rugraw will prepare an –Storm Water Pollution and Prevention control plan as part of the detailed final design. This plan will describe the erosion and sediment control practices planned for implementation during construction of the Project. The plan will include best management practices and is intended to minimize the erosion of soils in construction areas and limit the transport of sediment from the construction site into the stream. Below are some of the best management practices that would be included in the plan:

- Preserve existing vegetation where required and when feasible and initiate construction immediately following vegetation clearing to minimize the exposure of scarified soil to wind and water;
- Use temporary fencing, protective barriers, or other similar methods to protect vegetation not required, or authorized to be removed;
- Slope roadways and excavations away from washes and clear loose soils and pre-existing sediments in areas where haul roads would cross surface washes;
- Install riprap at the washes;
- Build small earthen embankments within washes to slow or divert surface water;
- Install silt fences in work areas near a wash to prevent sediment from entering the wash during rain storms;
- Apply water to disturbed soil areas of the project site to ensure excessive runoff does not occur and to control wind erosion and dust; and
- Implement complementary sediment controls to intercept and filter out soil particles mobilized by surface runoff due to construction activities.

1.4 FISHERIES

This section describes existing fish and aquatic habitat present in the Project area. It also discusses potential impacts resulting from construction and operation of the proposed Project, and presents proposed mitigation measures to minimize potential adverse impacts on fish and aquatic habitat.

This section analyzes the potential impacts that Project-related activities may have on common and non-special status species found in the Project area. Species listed as threatened or endangered under the federal Endangered Species Act (ESA) or California Endangered Species Act (CESA), species that are candidates or proposed for listing under the ESA or CESA, sensitive species, and designated critical habitats are addressed in Section 1.12 – Threatened, Endangered, and Sensitive (TES) Species and Critical Habitats.
Aquatic habitat and fish surveys were conducted within the bypass reach between the powerhouse (RM 20.6) and Angel Falls (RM 22.3) in July 2013 (Sellheim and Cramer 2013; see Appendix B of this exhibit). This survey included a quantification of the physical habitat characteristics of the bypass reach in order to model the carrying capacity for fish at various flows (Cramer and Ceder 2013; see Appendix C of this exhibit). Additionally, a snorkel survey was conducted to identify fish presence/absence. The habitat characterization results and fish observations from this survey are summarized below and are provided in detail in the Sellheim and Cramer (2013) report included in Appendix B. The production estimates found at various flows from the modeling results are also summarized below and are provided in detail in the by Cramer and Ceder (2013) report included in Appendix C.

1.4.1 Environmental Setting/Affected Environment

1.4.1.1 Aquatic Habitat

Below the town of Mineral, SF Battle Creek enters a canyon, which deepens until it reaches the confluence with North Fork Battle Creek near the town of Manton.

The Project area is characterized by steep slopes on both sides of a narrow channel dominated by large boulders. The entire stream channel was surveyed and dimensions of each channel unit were measured from the powerhouse site up to Angel Falls during July 2013 by Sellheim and Cramer (2013), and data reported here are taken from that survey. The channel is confined by either bedrock or hillslopes throughout. Stream gradient in the Project area averages about 5 percent throughout most of the reach, but increases to about 15 percent just below Angel Falls. These gradients are steeper than the typical range of less than 3 percent at which most Chinook salmon (*Oncorhynchus tshawytscha*) spawn (Montgomery et al. 1999), but within the upper range of steelhead (*O. mykiss*) spawning.

The creek is predominantly a single, narrow thread channel throughout the bypass reach; however, there are two approximately 100-meter-long side channels at different points in the reach. The mean active channel width ranges from 61.7 feet to 92.5 feet (18.8 meters to 28.2 meters) (overall mean = 85.0 feet [25.9 meters]). The stream channel unit types are dominated by fast-water habitats (cascades, rapids, and riffles) that compose over 80 percent of surface area, while pools compose about 15 percent of surface area (Figure 1.4-1).

**Figure 1.4-1.** Stream Area Composed by Each Channel Unit Type within the Survey Reach of SF Battle Creek (flow was 13 cfs during the survey)

Substrate in the bypass reach is dominated by boulders while fine substrate is rare. This composition reflects that high gradient and narrow confinement of the channel that result in high stream power during the high flow season. The presence of these high flows leaves a near absence of woody debris in the channel, and substrate that is dominated by large boulders. Boulders were the dominant substrate in all channel unit types, including pools, and the presence of fines was rare. More deposition of smaller substrate was observed in pools than in other channel unit types, although 60 percent of the pools contained no fine substrate and none contained more than 10 percent fines. Gravel and cobble were more common in pools than in other habitat unit types; however, these size classes rarely dominated the substrate composition.

Substrate in the vast majority of riffles was dominated by boulders, creating “pocket-water” habitat. As boulders intercept the water flow through these riffles, they generate scour, which results in a patchwork of fast, turbulent streamflow with small areas of slow, relatively deep pocket-water. These habitat features provided sufficient depth to support rearing of fish up to 150 to 200 mm in length during the flow of 13 cfs at which the stream was surveyed. Depths in these riffle habitats will become less desirable for trout as flows drop through the summer.

Sixteen of the 20 pools in the reach were 1 meter or more deep and capable of supporting resident trout through the low flow season. Many of the pools were relatively shallow, with maximum depths rarely exceeding 1.6 meters; however, there were three relatively deep pools (1.9 to 3.5 meters). All three of these pools were located directly downstream from cascade channel units, and the deepest was the plunge pool at the base of Angel Falls.
Gravel suitable for spawning was found in small patches (average area of 15 square meters; range 5 to 46 square meters) distributed throughout the reach. All gravel patches with surface areas greater than 3 square meters were identified and deemed suitable for a single pair of rainbow trout (*Oncorhynchus mykiss*). Fifty-four patches of spawnable-sized gravel were observed throughout the study reach with 33 inundated and 21 dry on July 3 and 4, 2013. Average depths of the inundated patches were less than 0.5 meter and velocities were mostly less than 0.15 meter per second (m/s). Gravel patches associated with pools tended to be inundated at 13 cfs, while about half of the patches associated with riffles and rapids were above the water line. Of the 21 patches that were not inundated, approximately half (n =11) were elevated more than 0.5 meter above the water surface at 13 cfs, indicating that a large increase in flow would be required to inundate those gravels to a depth suitable for spawning.

### 1.4.1.2 Fisheries

The Project area is above the current range of anadromy. The fisheries of the Battle Creek watershed have been affected since the early 1900s by the operations of small hydropower dams, which are currently owned by PG&E. The Battle Creek hydropower system has blocked access to salmon and steelhead in both forks of Battle Creek. The operation of Coleman National Fish hatchery near the confluence of Battle Creek with the Sacramento River has also limited and/or prohibited access to migratory fish to the upper watersheds. The weir at the Coleman National Fish Hatchery on lower Battle Creek has blocked or only permitted controlled access to salmon and steelhead since the 1950s. Upstream fish passage is confined primarily to below Coleman Dam with some limited passage possible at Coleman and Inskip dams, each of which are downstream of the Project area (RM 2.5 and 8.0, respectively). The South Diversion Dam (RM 14.35) on SF Battle Creek is the uppermost man-made blockage on SF Battle Creek.

A combined effort of stakeholders, PG&E, and a suite of state and federal agencies is involved in restoring natural populations of salmon and steelhead through the Battle Creek Salmon and Steelhead Restoration Project (BCSSRP). The BCSSRP is removing dams, improving passage at other dams, and restoring flows in several of the reaches previously affected by the existing PG&E hydropower projects. The uppermost existing hydropower diversion dam at the South Diversion is scheduled for removal. According to the Bureau of Reclamation, the status of this project is for removal of the structures in SF Battle Creek in 2015 and 2016. Adult fish passage is expected to be fully restored at three PG&E dams on SF Battle Creek by 2016, after which only flows and steep channel restrictions are likely to restrict access to holding and spawning habitat for salmonids (Sellheim and Cramer 2013).

At this point, no anadromous fish species are expected to be present above the South Diversion Dam until this passage barrier is removed. The Project area currently only supports a population of resident and stocked rainbow trout and some brown trout.
After the removal of this barrier, anadromous fish then must navigate the upper reaches of SF Battle Creek including Panther Grade, which is considered a putative barrier, with the assumption that it potentially is passable at higher flows.

In July 2013, snorkel surveys were conducted from the powerhouse to Angel Falls (RM 20.6 to 22.3) (Sellheim and Cramer 2013) where approximately half of the pool channel units, spread evenly throughout the Project area, were sampled. Rainbow trout were highly abundant and the only species observed in the pools. Juveniles 80 to 150 mm in fork length were the dominant size class, but larger yearlings (greater than 150 mm) were also represented. A few fish greater than 300 mm were observed in the deeper pools near the upper extent of the sample reach (i.e., Angel Falls).

Upstream of the Project area, immediately upstream from Angel Falls, two 100-meter reaches were sampled to characterize fish assemblages in August 2004 (CDFW 2004). Wild rainbow trout were captured in both reaches. The Reach 1 catch yielded a population estimate of 1,915 wild rainbow trout per mile while the Reach 2 catch yielded at least 2,300 wild rainbow trout per mile. Two hatchery rainbow trout and one brown trout were also captured. No other fish species were captured or observed.

Downstream of the Project area, immediately above Panther Grade, an 80-meter reach was sampled during the 2007-2008 Battle Creek Fish Community Study (USFWS 2010). This study was conducted to assess the community structure of fish populations in the Battle Creek watershed prior to the implementation of the large-scale BCSSRP efforts. Only one fish species, rainbow trout, was observed during the spring, summer, and fall months, with two species (rainbow trout and riffle sculpin [Cottus gulosus]) observed in the winter.

1.4.2 Project Impacts and Proposed Mitigation

1.4.2.1 Project Impacts

Potential direct and indirect Project effects are associated with temporary construction actions and subsequent operation activities. Specific impacts from construction activities could result from turbidity, loss of food resources and habitat, construction debris, or disturbance and noise. Impacts from operation activities include the potential effects of the minimum in-stream flow in the bypass reach on the habitat.

Increased sedimentation or erosion, resulting in increased turbidity, may occur due to activities associated with in-water construction actions, including placement of riprap, concrete, and placement of native rock. These actions have the potential to directly interfere with the soil-water interface and disturb bottom sediments. All construction actions that could contribute increased turbidity will occur within the designated work window for in-stream work or with an approved extension.
Additionally, to avoid or minimize potential impacts related to sedimentation or erosion, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and implemented in coordination with the RWQCB Section 401, the construction stormwater permit, and the dewatering permit. All requirements from the Water Quality Certification and other permits would be followed; those requirements will be mandated to prevent the degradation of surface water quality. Therefore, turbidity effects are expected to be minimal.

However, if turbidity levels do increase temporarily, they could potentially affect salmonid habitat in multiple ways. Potential effects of elevated suspended sediment on habitat may include reduced primary productivity due to decreased light penetration in the water column and resulting reduced food-web productivity. Also, resuspension of sediments could transiently deposit on adjacent areas and reduce other invertebrate species growth. Because the work will need to meet California State Surface Water Quality Standards during construction, no significant effects are expected to primary productivity and food-web productivity.

1.4.2.2 Operation Impacts

The proposed minimum instream flow of 13 cfs that is to be maintained in the bypass reach was assessed to determine its effects on resident rainbow trout. A range of flows were modeled to determine the effects of on the carrying capacity of the bypass reach for both rearing and spawning habitat available (Cramer and Ceder 2013).

Resident rainbow spawn in the late spring and need only 2 square meters of spawning area per spawning pair. As a result, resident trout would be able to spawn on many of the small gravel patches found in the bypass reach. Rainbow trout may spawn in shallower water than due to their smaller size, but it was assumed they would need the same 15 centimeters (cm) (about 6 inches) of depth that steelhead need. Model simulation results show that 235 trout redds could be supported at 13 cfs, and this increases only in small increments to 243 redds at 20 cfs and 249 redds at 30 cfs. Based on model simulations, the spawning capacity for resident rainbow trout was found to be less responsive to increases in flow (Figure 1.4-2).
Note: Dashed line shows the minimum area required for a spawning pair of resident rainbow trout. The points where the colored lines cross the dashed line are the cumulative number of patches with sufficient area for spawning.

Figure 1.4-2. Spawning Area Available in Each Gravel Patch Submerged to Suitable Depth in the Project Reach at Flows of 10, 13, and 15 cfs

Sellheim and Cramer (2013) observed a vibrant population of rainbow trout distributed throughout the proposed Project bypass reach during their survey in early July with a flow of 13 cfs. The modeling of habitat capacity further confirmed that flows of 10 cfs would provide spawning capacity capable of producing far more age-1 parr of rainbow trout than the rearing capacity can support.

Rearing capacity is determined by the lowest flow period of the year, a season during which the Project would not be operating and would not affect flows. Rainbow trout are thus limited by the rearing capacity of the natural habitat during the low-flow periods. The spawning capacity for rainbow trout is sufficient to produce far more parr than the rearing habitat can support. Even though adult rainbow could find ample habitat to spawn in, the low flows in the summer sharply constrain the number of parr that can be supported. Thus, the study’s findings support the conclusions that bypass flows in the range of 10 to 13 cfs would be sufficient to support and sustain a vibrant population of existing rainbow trout.

1.4.2.3 Proposed Mitigation

Conservation Measures

A variety of conservation measures and best management practices (BMPs) will be implemented prior to or during construction to reduce the potential for direct and indirect effects to ESA-listed species and their critical habitats. These measures are designed to reduce or
eliminate disturbance, turbidity, removal of biota, noise, debris falling into the water, and fish stranding.

BMPs that will be employed during construction include:

- Develop and implement a SWPPP in coordination with the RWQCB Section 401 permit, a construction stormwater permit, and a dewatering permit during construction.
- Comply with water quality monitoring requirements (such as from the RWQCB Section 401 Water Quality Certification) for turbidity, pH, etc.
- Confine in-water work activities to the designated work windows, except for the potential time extensions based on weather forecasts as described above.
- Install coffer dams, silt fences or other structures needed to isolate the in-water work area as necessary (or if monitoring of construction activities indicates potential exceedances of water quality standards) so that construction will be performed “in the dry” to reduce turbidity.
- Construction activities below the ordinary high water line will be performed in full compliance with all agency regulations and permits, including Streambed Alteration Permit which will be obtained from the CDFW.
- Use only clean and coarse materials and place via bucket close to the substrate surface to minimize sediment resuspension where material will be placed in-water. Fill material quantities will be optimized during design to minimize fill while maximizing habitat area and function.
- Materials from project construction (i.e., soil, rock, and other debris) will not be discharged to surface waters nor deposited where they could be eroded and carried to the stream by surface runoff or high stream flows.
- Control sedimentation with a system of surface runoff sills and ditches, which will include a sedimentation basin to allow solids to settle out before the water returns to the stream.
- Disturbed soil areas and fill slopes will be stabilized with silt fences and other erosion prevention measures.
- Permanent roads shall be surfaced with gravel to a depth and quantity sufficient to maintain a stable road surface.
- All concrete will be allowed to cure before it comes in contact with stream water.
- There will be no discharge of petroleum products or other construction materials into surface waters.
- If the diversion/intake structure is constructed in two units, the fish bypass unit will be built first to enable fish to pass upstream and downstream while the second unit is completed. If the entire diversion/intake structure is constructed as one unit, a temporary diversion culvert will be utilized to allow fish passage during this construction phase.

- There will be no unnecessary damage to the riparian habitat.

- The construction contractor will be furnished and will comply with all permit conditions issued by resource agencies for the Project.

Additionally, the design has incorporated conservation measures to ensure long-term benefits to the ecosystem and listed and proposed species, including:

- Only native plant species will be used for riparian plantings in areas disturbed by construction.

### 1.4.2.4 Proposed Mitigation

The following mitigation measures will ensure the protection of aquatic habitat and aquatic species in the from project effects.

**Fish Passage at Diversion Works**

The applicant would work with CDFW post-license submission to finalize the ultimate design for desired fish passage elements to be contained within the diversion dam instream bypass flow channel. This feature will ensure fish are able travel upstream and downstream at the diversion works when the power plant is operating or shut down. The fish passage structure will be designed in coordination with CDFW, with concurrence on final design with the applicant. The applicant will construct and maintain the fish passage as specified by the CDFW.

**Intake Structure**

The intake structure would be a 20-foot by 10-foot enclosed concrete structure located out of the normal stream wetted area constructed partially in the south bank above the stream (Exhibit F, Sheets F-7 and F-8). Project operating flows would be diverted into the structure through a 6-foot by 16-foot trash rack. Debris accumulating on the trash rack would be manually removed when debris impedes flow into the intake structure, and hauled away from the influence of the stream. The intake structure would have facilities to flush accumulated sediments. This would be accomplished by manually opening debris valves installed within the intake structure. For normal operations, the diverted water would pass through the intake structure and into the control/fish screen structure. A manually operated and automatically controlled sluice gate would isolate the control/fish screen structure, which would allow isolation of flows during periods of non-operation and maintenance.
Control/ Fish Screen Structure

The control/fish screen structure would be an approximately 12-foot by 48-foot enclosed concrete structure. The control/fish screen structure would be connected to the intake structure and located within the disturbed ditch grade and in the south bank of the stream out of the influence of the natural streambed.

Located within the control/fish screen structure would be nine 4-foot by 8-foot stainless steel perforated flat panel screens. Specifications for each screen panel are as follows:

- Hole type: round
- Pattern: 5/32 by 3/16 centers
- Pattern type: 60 degree staggered
- Open area: 63 percent
- Holes per square inch: 33
- Wetted screen area per panel: 31.67 square feet
- Total wetted screen area: 285 square feet

Fish screens would be automatically cleaned by a travelling screen cleaner as frequently as necessary to prevent flow impedance and violation of the approach velocity criteria. Frequency of cleaning cycles would be determined by installation of water level transducers (sensors) to continually monitor water surface level (WSL) on either side of the screens. Operating WSL within the structure would be maintained within ±0.5 inch. Flows to the turbine would be determined by changes in the WSL and automatically adjusted.

WSL sensors at the control/fish screen structure and pressure sensors at the powerhouse would continually monitor operating parameters. In the event of unanticipated pipeline rupture, inflow into the structure would be stopped by closure of the automatically controlled sluice gate located at the inlet to the structure. The automatically controlled sluice gate would also be programmed to close, relative to the ramping sequence, maintaining the WSL in the structure during normal maintenance and/or dewatering scenarios.

Emergency Shut-off Valve

An emergency sluice gate located within the control/screen structure would block water flowing into the penstock in the unlikely event of penstock rupture. Pressure-differential, water level, and velocity sensors would be installed to sense any anomaly indicating a rupture in the penstock.
Instream Bypass Flow

The instream bypass flow would pass through a slot in the upstream diversion dam and cascade over native boulders that would be retrieved from the instream excavations and be placed on the downstream side of the diversion dam to simulate a natural boulder cascade similar to those found in many locations in SF Battle Creek. As the Project would have a minimum operating limit of 5 cfs and a maximum flow capacity through the turbines of 95 cfs, the flow regime through the bypass reach can be predicted through the use historical flow data from the Old Highway 36 gauge (near the Project intake). A proposed minimum instream bypass flow of 13 cfs would be maintained whenever the Project is operating, provided the stream is naturally flowing at 13 cfs or greater. At lower flows, and at natural flows up to 18 cfs, the entire natural streamflow would stay in the stream and not be diverted because the Project would cease to operate. At flows equal to 18 cfs (13 cfs plus the 5 cfs needed to initiate turbine operation), the Project would operate at the minimum operating flow of 5 cfs. Hydropower operations would typically cease in early July and resume in mid to late November. Flows would also naturally exceed 108 cfs (95 cfs turbine capacity plus 13 cfs bypass flow) during the spring runoff season (April to June), resulting in bypass flow frequently in the 30 to 60 cfs range.

The proposed minimum instream flow of 13 cfs was designated to sustain functions that support fish and habitat in the stream. Minimum instream flow releases during Project operations would be maintained at all times and monitored in accordance with requirements of the CDFW.

Sluicing Operations

Sluicing operations would be completed in a manner that would not increase sediment deposition above background levels and in compliance with CDFW requirements.

Air Entrainment and Nitrogen Supersaturation

The Project intake, penstock, and turbines would be designed to prevent air entrainment and gas supersaturation in the powerhouse discharge waters. Protections of downstream fish species, maximum plant efficiency, and good turbine operation have the same goals in this respect. Excess dissolved gases in water can be harmful to fish, particularly small fingerlings and fry. Gas can come out of solution after it enters a fish’s bloodstream and causes internal hemorrhaging and “pop-eye.” Increase of both air bubbles and dissolved air would be prevented by designing the intake to avoid vortices and prevent air entry into the pipeline. The Pelton turbine would spray water against the turbine buckets and casing, which would release dissolved gases at atmospheric pressure.
Flow Continuity and Ramping Rates
A system of control features at the diversion works and the powerhouse would control changes in the rate of water diversion. Any rapid changes in the rate of flow diversion could cause adverse effects on fish, wildlife, or even human safety through rapid changes in water surface elevations in the reaches below the diversion works. These changes could result either from normal Project operation or a load rejection. Two controls would regulate the rate of diversion:

1. **Ramping Rate:** Under normal operation any change in diversion flow, whether from powerhouse startup or shutdown would be regulated slowly. The standard rate-of-change would meet the agreed upon criteria of the CDFW of 30 percent of the existing stream flow per hour (10 percent load every 20 minutes) or less, regulated in small incremental stages by automatic or manual valve control. A reduction or increase of water flow through the turbine will be automatically controlled to prevent the de-watering of the stream in the affected reach and to maintain a uniform flow downstream of the tailrace. Monitoring of real-time flows through the bypass reach and through and below the tailrace will automatically control the closing or opening of turbine nozzles.

2. **Flow Continuity:** In the event of load rejection when power is no longer able to be transmitted, generation must stop as quickly as possible or the generator and circuits may be damaged. The Pelton turbine has automatic jet deflectors to divert the water stream from the turbine cups on the turbine wheel and would continue the water flow in the system and tailrace.

1.4.3 Monitoring
During Project operation, temperature, flow, ramping rates, and fish attraction to tailrace will be monitored. The monitoring of these elements is described generally below.

1.4.3.1 Temperature
Water temperatures would be monitored at six locations: 1) the diversion/intake structure, 2) the bridge at SR 36, 3) within the bypass reach above the tailrace, 4) within the bypass reach below the tailrace, 5) within the tailrace, and 6) the wooden bridge at Ponderosa, just downstream of Panther Grade. These monitoring locations are strategically located to capture the water temperatures of the minimum instream flows through the bypass reach, the water temperature flowing through the penstock, and the return of this water to the SF Battle Creek. The water temperature of the mixture of the bypass reach and the returned diverted flow would be captured just below the end of the Project area and farther downstream below Panther Grade.
1.4.3.2 Flows

Three flow monitoring stations would be established to ensure that minimum instream flows are met. Two of the stations would be placed within the bypass reach: one at the SR 36 bridge above Angel Falls, and the other immediately above the tailrace. A third station would be set up downstream of the tailrace where the turbine outflow and bypass flows have mixed.

1.4.3.3 Ramping Rates

Ramping rates would be recorded at each event to confirm that the CDFW criteria of rate 30 percent of the existing streamflow per hour are met. The ramping rates would be integrated into the control mechanisms of the Project, and data from the stream flow gages would inform these rates.

1.4.3.4 Fish Attraction to Tailrace

The tailrace was located and designed to dissipate flows naturally by passing the return flow over a cascading boulder field into a boulder dominated feature in the SF Battle Creek. However, to ensure that the tailrace will not create a fish attractant, the tailrace will be monitored through observations. Whenever the facility is visited by staff, observations of fish holding or jumping to access the tailrace will be recorded in a log book. If these activities are found to occur repetitively, staff will coordinate with CDFW and NOAA Fisheries to provide modifications of the tailrace structure to discourage fish attraction.

1.5 WILDLIFE AND HABITAT

This section describes existing wildlife habitat and wildlife species present in the Project area. It also discusses potential impacts resulting from construction and operation of the proposed Project, and presents proposed mitigation measures to minimize potential adverse impacts on wildlife and habitat.

For the purposes of this section, the Survey Area includes a 400-foot-wide corridor centered on the Project alignment and multipurpose areas located outside of the 400-foot-wide survey corridor. The Project area includes the area located within 1 mile of the Project.

This section analyzes the potential impacts that Project-related activities may have on common and non-special status species found in the Project area. Species listed as threatened or endangered under the federal ESA or the CESA, species that are candidates or proposed for listing under the ESA or CESA, sensitive species, and designated critical habitats are addressed in Section 1.12 – Threatened, Endangered, and Sensitive Species and Critical Habitats. Botanical resources and wetlands are addressed in Section 1.6.

Terrestrial biological surveys were conducted within a 400-foot-wide survey corridor centered on the Project alignment and within multipurpose areas located outside of the 400-foot-wide...
survey corridor in May, June, and September 2013. Desktop research and literature reviews included a 1-mile buffer around the Project to ascertain potential effects to nesting birds and aquatic wildlife species that may be located outside of the Survey Area (e.g., downstream of the Project). Results of the surveys and desktop research are summarized in the following attached reports: California Red-legged Frog Site Assessment (Appendix E), Botanical Resources Study Report (Appendix F), Delineation of Wetlands and Other Waters Report (Appendix G), and Threatened, Endangered, and Sensitive Wildlife Species Habitat Assessment (Appendix H). In addition, information was obtained from biological studies conducted in the past in the vicinity of the Project (SLMC 1996; DPA 1996, 1998, 2012a, 2012b; DGBK 2002, 2012; Contour 1995).

1.5.1 Environmental Setting

1.5.1.1 Habitat

The Project is in the Cascade Ranges Region of the California Floristic Province (Hickman 1993). Habitats present within the Survey Area include Sierran mixed conifer, montane hardwood communities, chaparral, annual grassland, blue oak woodland communities, ponderosa pine and plantation, riparian and wetland, rock, agricultural, and disturbed/developed (Table 1.5-1).

<table>
<thead>
<tr>
<th>Table 1.5-1. Habitats within the Survey Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habitat</strong></td>
</tr>
<tr>
<td>Annual Grassland</td>
</tr>
<tr>
<td>Agricultural</td>
</tr>
<tr>
<td>Irrigated Hayfield</td>
</tr>
<tr>
<td>Old Orchard</td>
</tr>
<tr>
<td>Blue Oak Woodland Communities</td>
</tr>
<tr>
<td>Blue Oak-Foothill Pine-Interior Live Oak</td>
</tr>
<tr>
<td>Blue Oak Woodland</td>
</tr>
<tr>
<td>Chaparral</td>
</tr>
<tr>
<td>Masticated Woodland</td>
</tr>
<tr>
<td>Mixed Chaparral</td>
</tr>
<tr>
<td>Montane Chaparral</td>
</tr>
<tr>
<td>Disturbed/Developed</td>
</tr>
<tr>
<td>Disturbed</td>
</tr>
<tr>
<td>Himalayan Blackberry (Rubus armeniacus)</td>
</tr>
<tr>
<td>Residential-Developed</td>
</tr>
</tbody>
</table>
Table 1.5-1. Habitats within the Survey Area (continued)

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>6.99</td>
</tr>
<tr>
<td>Montane Hardwood Communities</td>
<td>92.43</td>
</tr>
<tr>
<td>Montane Hardwood</td>
<td>23.55</td>
</tr>
<tr>
<td>Montane Hardwood-Conifer</td>
<td>68.88</td>
</tr>
<tr>
<td>Ponderosa Pine and Plantation</td>
<td>41.05</td>
</tr>
<tr>
<td>Plantation</td>
<td>24.25</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>16.80</td>
</tr>
<tr>
<td>Riparian and Wetland</td>
<td>7.29</td>
</tr>
<tr>
<td>Riparian</td>
<td>3.45</td>
</tr>
<tr>
<td>Riverine-Montane Riparian</td>
<td>3.77</td>
</tr>
<tr>
<td>Wetland</td>
<td>0.07</td>
</tr>
<tr>
<td>Rock</td>
<td>4.40</td>
</tr>
<tr>
<td>Sierran Mixed Conifer</td>
<td>340.36</td>
</tr>
<tr>
<td>Total</td>
<td>725.88</td>
</tr>
</tbody>
</table>

1/ Note that some acres may differ from technical reports due to slight revisions in Project alignment made January 2014.

The predominant plant community throughout the central and eastern portions of the Survey Area is evergreen forest corresponding best to the Sierran mixed conifer forest type (Mayer and Laudenslayer 1988). Portions of Sierran mixed conifer habitat support mature second growth, but old growth forest structure is lacking, although some snag habitat exists in the eastern portion of the Project. Montane hardwood communities are second most common and scattered throughout the Survey Area, with the exception of the eastern end of the Survey Area. Chaparral communities, including mixed chaparral and montane chaparral (Mayer and Laudenslayer 1988), are primarily found in the western and central portions of the Survey Area, interspersed with montane hardwood, annual grassland, and blue oak woodlands. Annual grassland (Mayer and Laudenslayer 1988) is most prevalent in the western portion of the Survey Area and is dominated by non-native grasses. Blue oak woodlands occur in the western portion of the Survey Area and include those areas mapped as blue oak wood and blue oak–foothill pine–interior live oak habitats (Mayer and Laudenslayer 1988).

Small areas of riparian and wetland, rock, agricultural, and disturbed/developed habitats also occur within the Survey Area. Riparian habitat occurs along SF Battle Creek, Soap Creek, and a few other unnamed stream channels in the western and west central portions of the Survey Area. Riparian vegetation is relatively sparse along SF Battle Creek because of steep slopes and rocky soils, and along Soap Creek and other streams as a result of previous disturbance and forest fires that occurred in 2012 in the central and western portions of the Project area. Rock habitat includes areas of exposed bedrock (including cliffs), loose talus, and boulder fields.
These areas are primarily unvegetated and occur in the eastern and central portions of the Survey Area.

Much of the Project area has been logged in the past, and much of the private lands traversed by the pipeline/penstock and transmission line alignments have been logged heavily, some clear-cut, within the last 10 years. Disturbance by historic and ongoing logging activities has been relatively high, with much soil horizon displacement and barren substrates apparent. Other disturbed habitats are associated with margins of existing access roads in the central and eastern portions of the Project area and residential development in the western portion of the Project area. Habitats are discussed in more detail in Section 1.6.

1.5.1.2 Wildlife

As discussed in Section 5.2.2 of the Threatened, Endangered, and Sensitive Wildlife Species Habitat Assessment Report (Appendix H), non-TES wildlife species observed within the Survey Area are listed in Table 1.5-2. Although most species were observed directly, the presence of some species was indicated through observation or identification of tracks, burrows, scat, other sign, call, or song.

Table 1.5-2. Common Wildlife Species Observed Within the Survey Area

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Habitat(s)</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American bullfrog</td>
<td><em>Rana catesbeiana</em></td>
<td>irrigation pond</td>
<td>alarm call</td>
</tr>
<tr>
<td><strong>Reptiles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>garter snake</td>
<td><em>Thamnophis</em> sp.</td>
<td>riparian</td>
<td>direct</td>
</tr>
<tr>
<td>mountain garter snake</td>
<td><em>Thamnophis elegans</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>northern alligator lizard</td>
<td><em>Elgaria coerulea</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>sagebrush lizard</td>
<td><em>Sceloporus graciosus</em></td>
<td>Sierran mixed conifer, blue oak-foothill pine-interior live oak, disturbed</td>
<td>direct</td>
</tr>
<tr>
<td>sharp-tailed snake</td>
<td><em>Contia tenuis</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acorn woodpecker</td>
<td><em>Melanerpes formicivorus</em></td>
<td>Sierran mixed conifer, blue oak woodland, blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>American dipper</td>
<td><em>Cinclus mexicanus</em></td>
<td>riverine-montane riparian</td>
<td>direct</td>
</tr>
<tr>
<td>American goldfinch</td>
<td><em>Carduelis tristis</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>American robin</td>
<td><em>Turdus migratorius</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>Common Name</td>
<td>Scientific Name</td>
<td>Habitat(s)</td>
<td>Observation</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------</td>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Anna’s hummingbird</td>
<td>Calypte anna</td>
<td>blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>Bewick’s wren</td>
<td>Thryomanes bewickii</td>
<td>mixed chaparral</td>
<td>direct</td>
</tr>
<tr>
<td>black-chinned hummingbird</td>
<td>Archilochus alexandri</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>Brewer’s blackbird</td>
<td>Euphagus cyanocephalus</td>
<td>irrigated hayfield, annual grassland</td>
<td>direct</td>
</tr>
<tr>
<td>California quail</td>
<td>Callipepla californica</td>
<td>blue oak woodland, blue oak-foothill pine-interior live oak</td>
<td>direct, song</td>
</tr>
<tr>
<td>California towhee</td>
<td>Pipilo crissalis</td>
<td>blue oak woodland, montane chaparral</td>
<td>direct, song</td>
</tr>
<tr>
<td>Cassin’s vireo</td>
<td>Vireo cassini</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>cliff swallow</td>
<td>Petrochelidon pyrrhonota</td>
<td>blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>common raven</td>
<td>Corvus corax</td>
<td>Sierran mixed conifer, blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>European starling</td>
<td>Sturnus vulgaris</td>
<td>irrigated hayfield, residential-developed</td>
<td>direct, song</td>
</tr>
<tr>
<td>flycatcher</td>
<td>Empidonax sp.</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>MacGillivray’s warbler</td>
<td>Oporornis tomiei</td>
<td>Sierran mixed conifer</td>
<td>direct, song</td>
</tr>
<tr>
<td>mountain bluebird</td>
<td>Sialia currucoides</td>
<td>blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>mountain chickadee</td>
<td>Poecile gambeli</td>
<td>Sierran mixed conifer</td>
<td>direct, song</td>
</tr>
<tr>
<td>mourning dove</td>
<td>Zenaida macroura</td>
<td>blue oak woodland, residential-developed</td>
<td>direct, song</td>
</tr>
<tr>
<td>northern flicker</td>
<td>Colaptes auratus</td>
<td>Sierran mixed conifer, blue oak woodland, blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>northern pygmy-owl</td>
<td>Glaucidium gnoma</td>
<td>blue oak woodland</td>
<td>direct</td>
</tr>
<tr>
<td>Oregon dark-eyed junco</td>
<td>Junco hyemalis</td>
<td>Sierran mixed conifer</td>
<td>direct, song</td>
</tr>
<tr>
<td>red-tailed hawk</td>
<td>Buteo jamaicensis</td>
<td>Sierran mixed conifer</td>
<td>direct, call</td>
</tr>
<tr>
<td>rufous hummingbird</td>
<td>Selasphorus rufus</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>rufous-crowned sparrow</td>
<td>Aimophila ruficeps</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>spotted towhee</td>
<td>Pipilo maculatus</td>
<td>Sierran mixed conifer, blue oak-foothill pine-interior live oak</td>
<td>direct, song</td>
</tr>
<tr>
<td>Steller’s jay</td>
<td>Cyanocitta stelleri</td>
<td>Sierran mixed conifer</td>
<td>direct, song</td>
</tr>
<tr>
<td>turkey vulture</td>
<td>Cathartes aura</td>
<td>Sierran mixed conifer, annual grassland, blue oak woodland, residential-developed</td>
<td>direct</td>
</tr>
<tr>
<td>violet-green swallow</td>
<td>Tachycineta thalassina</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>western bluebird</td>
<td>Sialia mexicana</td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
</tbody>
</table>
Table 1.5-2.  Common Wildlife Species Observed Within the Survey Area (continued)

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Habitat(s)</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>western scrub-jay</td>
<td><em>Aphelocoma californica</em></td>
<td>blue oak woodland, annual grassland, blue oak-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>yellow-rumped warbler</td>
<td><em>Dendroica coronata</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>black bear</td>
<td><em>Ursus americanus</em></td>
<td>Sierran mixed conifer</td>
<td>direct, scat, tracks</td>
</tr>
<tr>
<td>black-tailed jackrabbit</td>
<td><em>Lepus californicus</em></td>
<td>Sierran mixed conifer, blue oak woodland, blue oak-foothill pine-interior live oak</td>
<td>direct, scat</td>
</tr>
<tr>
<td>bobcat</td>
<td><em>Felis rufus</em></td>
<td>ponderosa pine</td>
<td>scat, scrape</td>
</tr>
<tr>
<td>chipmunk</td>
<td><em>Neotamias sp.</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
<tr>
<td>coyote</td>
<td><em>Canis latrans</em></td>
<td>Sierran mixed conifer, blue oak-foothill pine-interior live oak</td>
<td>scat</td>
</tr>
<tr>
<td>ground squirrel</td>
<td><em>Spermophilus sp.</em></td>
<td>masticated woodland, blue oak woodland</td>
<td>burrows</td>
</tr>
<tr>
<td>mule deer</td>
<td><em>Odocoileus hemionus</em></td>
<td>Sierran mixed conifer, blue oak woodland, blue oak-foothill pine-interior live oak</td>
<td>direct, scat, tracks</td>
</tr>
<tr>
<td>pocket gopher</td>
<td><em>Thomomys sp.</em></td>
<td>annual grassland</td>
<td>mounds</td>
</tr>
<tr>
<td>striped skunk</td>
<td><em>Mephitis mephitis</em></td>
<td>blue-foothill pine-interior live oak</td>
<td>direct</td>
</tr>
<tr>
<td>western gray squirrel</td>
<td><em>Sciurus griseus</em></td>
<td>Sierran mixed conifer</td>
<td>direct, sign</td>
</tr>
<tr>
<td>yellow-bellied marmot</td>
<td><em>Marmota flaviventris</em></td>
<td>Sierran mixed conifer</td>
<td>direct</td>
</tr>
</tbody>
</table>

The most commonly observed species included sagebrush lizard, scrub jay, Steller’s jay, yellow-rumped warbler, California quail, Oregon dark-eyed junco, northern flicker, acorn woodpecker, raven, turkey vulture, black-tailed jackrabbit, and mule deer. TES wildlife species are discussed in Section 1.12.

1.5.2 Project Impacts and Proposed Mitigation

This section describes potential impacts to wildlife and habitat resulting from construction and operation/maintenance of the Project. Potential Project-related impacts to wildlife species and habitat may include disturbance and displacement; habitat loss, degradation, and fragmentation; and mortality.

1.5.2.1 Construction Impacts

Vegetation clearing, construction noise, potential introduction and/or spread of noxious weeds, and increased human activity may affect wildlife and their habitats during construction of the Project.
Clearing of vegetation for Project facilities may result in direct loss of habitat, which could displace wildlife to similar habitats outside of the construction zone. Wildlife species may be disturbed by construction noise and increased human activity in the area. This may result in wildlife species expending energy reserves to leave the Project area, which may have an impact on survival of individuals, particularly if construction occurs during winter when food sources may be diminished.

Direct habitat loss may result for wildlife species currently inhabiting the area within the footprint of construction, and degradation may occur as a result of increased noise, human activity, erosion and sedimentation; and the potential introduction or spread of noxious weeds. For species that are dependent on forested habitat, loss of habitat would be permanent in those areas that will not be revegetated with forest species.

For species that are utilizing herbaceous or shrub habitats, loss would be temporary; species would recolonize disturbed areas once those areas are revegetated. Habitat fragmentation may occur in intact forested areas subject to vegetation clearing for construction of the Project.

Injury or mortality of individuals may occur from collisions with vehicles, construction equipment, or structures; and/or inadvertent crushing of inhabited dens, burrows, snags, or logs.

### 1.5.2.2 Operation Impacts

Vegetation maintenance of the pipeline/penstock and transmission line ROWs during operation of the Project will likely result in the permanent conversion of some forested areas to herbaceous or shrub habitats.

### 1.5.2.3 Proposed Mitigation

Proposed mitigation measures to protect wildlife and minimize Project-related impacts include:

- Conduct preconstruction surveys for migratory birds within 100 feet of the Project (disturbance area) prior to construction if disturbance will occur during the nesting season (typically April 15 to July 31). If an active nest (containing eggs or young) of a bird species protected under the Migratory Bird Treaty Act is found during either preconstruction surveys or construction activities, the nest will be identified to species, inconspicuously marked, and a 100-foot buffer will be implemented with vegetation left in place until any young have fledged.

- Conduct preconstruction pedestrian or aerial nest surveys in suitable habitat within 1 mile of the Project disturbed area during the appropriate nesting time periods needed to identify raptor nest locations and establish the status of nests. Appropriate buffers will
be applied to active nests during construction. All encounters of nesting raptors in the Survey Area will be reported to the biological monitor and to appropriate agencies.

- Design and construct the transmission line in compliance with Avian Power Line Interaction Committee (APLIC) guidance to reduce impacts to avian species (APLIC 2006, 2012).
- Employ biological monitors during construction to ensure that measures to protect biological resources are implemented appropriately.

Additional measures that would help protect wildlife and minimize impacts, but are not solely directed at wildlife, are included in Section 1.6.

1.5.2.4 Schedule for Mitigation

Planning and implementation of mitigation measures will be initiated at the time of License issuance and will be sequenced to be completed according to individual construction or study schedules.

1.6 BOTANICAL AND WETLAND RESOURCES

This section describes existing botanical and wetland resources present within the Project area, discusses potential impacts as a result of the proposed project, and presents proposed mitigation actions that will minimize potential negative impacts on botanical and wetland resources as a result of project implementation. This section analyzes the potential impacts the project-related activities may have on common botanical species and vegetation communities in the Project area. Species listed as threatened or endangered under the federal ESA or the CESA, designated critical habitat, and other special-status plant species are addressed in Section 1.12 – Threatened, Endangered, and Sensitive Species and Critical Habitats.

For the purposes of this section, the Project area includes a 400-foot-wide corridor centered on the Project alignment and multipurpose areas located outside of the 400-foot-wide corridor.

Surveys for botanical and wetland resources in the Project area were conducted in May, June, and September 2013. Prior to the field surveys, desktop research and literature reviews were conducted to identify known botanical resources, including vegetation communities, noxious weeds, special-status plant species, and wetland resources, that may occur within the vicinity of the Project area. This desktop research and literature review included prior biological surveys of the hydroelectric portion of the Project (Contour 1995; SLMC 1996; DGBC 2002, 2012, 2013). Results of the surveys and desktop research are summarized in the following attached reports: *Botanical Resources Study Report* (Appendix F) and *Delineation of Wetlands and Other Waters Report* (Appendix G).
1.6.1 Environmental Setting

1.6.1.1 Vegetation Communities

Vegetation communities present within the Project area were mapped by Dittes and Guardino Consulting in March 2013 through detailed review of aerial photographs and field spot-checks. These vegetation communities were field-verified during field surveys in May, June, and September 2013. Table 1.6-1 below lists the acres of each mapped vegetation community within the 400-foot survey corridor centered along the Project alignment. Vegetation communities observed within the Project area are briefly described below.

A high-intensity fire burned extensive portions of the Project area in the summer of 2012. Portions of many of the vegetation communities in the Project area, including blue oak woodland, chaparral, montane hardwood, ponderosa pine and pine plantation, riparian, and Sierran mixed conifer forest, were impacted by these fires. The fire was of such high intensity in some areas that very few if any live standing trees or shrubs remained and the understory was burned down to mineral soil. The vegetation descriptions below describe the more intact areas of each of the impacted vegetation communities.

**Table 1.6-1. Vegetation Communities within the Project Area**

<table>
<thead>
<tr>
<th>Vegetation Community</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Grassland</td>
<td>64.81</td>
</tr>
<tr>
<td>Agricultural</td>
<td>4.36</td>
</tr>
<tr>
<td>Irrigated Hayfield</td>
<td>3.88</td>
</tr>
<tr>
<td>Old Orchard</td>
<td>0.48</td>
</tr>
<tr>
<td>Blue Oak Woodland Communities</td>
<td>67.21</td>
</tr>
<tr>
<td>Blue Oak-Foothill Pine-Interior Live Oak</td>
<td>37.11</td>
</tr>
<tr>
<td>Blue Oak Woodland</td>
<td>30.10</td>
</tr>
<tr>
<td>Chaparral</td>
<td>86.78</td>
</tr>
<tr>
<td>Masticated Woodland</td>
<td>6.60</td>
</tr>
<tr>
<td>Mixed Chaparral</td>
<td>17.23</td>
</tr>
<tr>
<td>Montane Chaparral</td>
<td>62.95</td>
</tr>
<tr>
<td>Disturbed/Developed</td>
<td>17.19</td>
</tr>
<tr>
<td>Disturbed</td>
<td>6.00</td>
</tr>
<tr>
<td>Himalayan Blackberry (Rubus armeniacus)</td>
<td>2.08</td>
</tr>
<tr>
<td>Residential-Developed</td>
<td>2.12</td>
</tr>
<tr>
<td>Road</td>
<td>6.99</td>
</tr>
</tbody>
</table>
Table 1.7-1. Vegetation Communities within the Project Area (continued)

<table>
<thead>
<tr>
<th>Vegetation Community</th>
<th>Acres²/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montane Hardwood Communities</td>
<td>92.43</td>
</tr>
<tr>
<td>Montane Hardwood</td>
<td>23.55</td>
</tr>
<tr>
<td>Montane Hardwood-Conifer</td>
<td>68.88</td>
</tr>
<tr>
<td>Ponderosa Pine and Plantation</td>
<td>41.05</td>
</tr>
<tr>
<td>Plantation</td>
<td>24.25</td>
</tr>
<tr>
<td>Ponderosa Pine</td>
<td>16.80</td>
</tr>
<tr>
<td>Riparian and Wetland</td>
<td>7.29</td>
</tr>
<tr>
<td>Riparian</td>
<td>3.45</td>
</tr>
<tr>
<td>Riverine-Montane Riparian</td>
<td>3.77</td>
</tr>
<tr>
<td>Wetland</td>
<td>0.07</td>
</tr>
<tr>
<td>Rock</td>
<td>4.40</td>
</tr>
<tr>
<td>Sierran Mixed Conifer</td>
<td>340.36</td>
</tr>
<tr>
<td>Total</td>
<td>725.88</td>
</tr>
</tbody>
</table>

²/ Note that some acres may differ from technical reports due to slight revisions in Project alignment made January 2014.

Annual Grassland

The annual grassland vegetation type is primarily found in the western portion of the Project area. This vegetation community is typically dominated by non-native annual grasses and forbs, although the species composition in this vegetation type does vary to some degree by setting, soil, and adjacent vegetation communities. Deeper more productive soils are dominated by non-native annual grasses including wild oats (*Avena* spp.), foxtail barley (*Hordeum murinum*), rattail sixweeks grass (*Festuca myuros*), annual dogtail (*Cynosurus echinatus*), medusa head (*Elymus* [*Taeniatherum*] *caput-medusae*), and several species of brome, including soft brome (*Bromus hordeaceus*), cheatgrass (*Bromus tectorum*), and ripgut brome (*Bromus diandrus*). Native and non-native forbs commonly found in these communities include dove weed (*Croton setigerus*), filaree (*Erodium* spp.), and rose clover (*Trifolium hirtum*). Yellow star thistle (*Centaurea solstitialis*), a listed noxious weed, is also common and abundant in annual grasslands in the Project area.

Annual grassland vegetation found on rocky, shallow soils in the central portion of the Project area tends to be more diverse and support a higher proportion of native plant species. Annual grasses in these areas still tend to be dominated by non-native species, such as rattail sixweeks grass, soft brome, cheatgrass, and nit grass (*Gastridium phleoides*). In addition to the species noted above, native and non-native forbs found in these areas include lotus (*Acmispon* spp.), purple clarkia (*Clarkia purpurea* ssp. *quadriovulnera*), slender cottonweed (*Micropus californicus*),...
California knotweed (*Polygonum californicum*), blue dicks (*Dichelostemma capitatum* spp. *capitatum*), harvest brodiaea (*Brodiaea elegans* spp. *elegans*), pink grass (*Petrophaga dubia*), and filaree. Many of the non-native annual grasses and forbs observed in the annual grassland vegetation community are listed noxious weeds (see Section 1.6.1.2 for further details).

**Rock**

Areas mapped as rock include areas of exposed bedrock, loose talus, and boulder fields. These areas are primarily unvegetated. Rock areas are found primarily in the eastern and central portions of the Project area.

**Agricultural**

Areas mapped as agricultural include irrigated hayfields and an old orchard. These agricultural areas are located on the west end of the Project area near the town of Manton.

**Blue Oak Woodland**

Blue oak woodland vegetation communities include those mapped as blue oak-foothill pine-interior live oak and blue oak woodland. The blue oak-foothill pine-interior live oak vegetation community occurs in scattered patches in the western portion of the Project area, with the largest stands in the northwest corner of the Project area. This vegetation community consists of a dense canopy of interior live oak (*Quercus wislizenii*) with scattered black oak (*Quercus kelloggii*), blue oak (*Quercus douglasii*), and emergent gray pine (*Pinus sabiniana*) trees. A few ponderosa pine (*Pinus ponderosa*) trees also occur in this community, especially on the south side of Hazen Road. Shrubs in this community include those shared by the surrounding/intergrading mixed chaparral community. Non-native annual grasses, such as wild oats, species of brome (*Bromus* spp.), and annual fescues (*Festuca* spp.), occur in the understory and occupy gaps in this community.

The blue oak woodland community also occurs in the western portion of the Project area and intergrades with annual grassland, blue oak-foothill pine-interior live oak and mixed chaparral communities. This community is dominated by blue oak with scattered gray pine and black oak trees. Scattered scrub species include buck brush (*Ceanothus cuneatus*) and other shrubs common in the adjacent mixed chaparral community.

**Chaparral**

Chaparral vegetation types found in the Project area include mixed chaparral, montane chaparral, and masticated woodland. The mixed chaparral vegetation community is primarily found in scattered patches in the western portion of the Project area. Mixed chaparral communities exist in a mosaic pattern and intergrade with the surrounding woodland and hardwood-conifer forest communities. This community is characterized by a predominance of shrub species and is distinguished from the surrounding woodlands by a sparse or absent tree
canopy. Dominant shrubs in this community include deer brush (*Ceanothus integerrimus*), scrub oak (*Quercus berberidifolia*), whiteleaf manzanita (*Arctostaphylos manzanita*), sticky whiteleaf manzanita (*A. viscosa*), buck brush, hollyleaf redberry (*Rhamnus ilicifolia*), poison oak (*Toxicodendron diversilobum*), fragrant sumac (*Rhus aromatica*), redbud (*Cercis occidentalis*), mountain mahogany (*Cercocarpus betuloides*) and yerba santa (*Eriodictyon californicum*). Similar to adjacent oak woodland communities, annual grasses such as wild oats, and annual bromes and fescues, occupy gaps and the understory in this community. A portion of the mixed chaparral vegetation type along Hazen Road in the western portion of the Project area was masticated during the 2012 to 2013 growing season, although there are some mature shrubs that have been left along the road edges.

The montane chaparral vegetation community is primarily found in the western and central portions of the Project area. The montane chaparral vegetation community tends to be less diverse than mixed chaparral and in portions of the Project area buck brush and yerba santa can form dense, almost homogenous stands. Other shrub and scattered tree species found in this vegetation community include interior live oak, Oregon white oak (*Quercus garryana* var. *breweri*), scrub oak, redbud, and mountain mahogany.

**Disturbed and Developed**

Areas mapped as developed include residential-developed areas and existing paved roads on the west end of the Project area near the town of Manton. Areas mapped as disturbed are associated with areas disturbed for timber harvesting activities on SPI land. Also included in this category is an area of dense Himalayan blackberry (*Rubus armeniacus*) in the west-central portion of the Project area near Soap Creek. This area consists of a dense thicket of predominantly Himalayan blackberry, a noxious weed ranked as “high” by the California Invasive Plant Council (Cal-IPC). Another non-native blackberry, cutleaf blackberry (*Rubus laciniatus*), was also common in this area.

**Montane Hardwood**

Montane hardwood vegetation communities are found scattered throughout the Project area, with the exception of the eastern edge of the Project area adjacent to SF Battle Creek. The montane hardwood category includes vegetation communities mapped as montane hardwood and montane hardwood-conifer.

The canopy of the montane hardwood-conifer community consists of a mix of various conifer and oak trees. Ponderosa pine is the dominant conifer in this community. Gray pine, Douglas-fir (*Pseudotsuga menziesii*) and incense cedar (*Calocedrus decurrens*) trees may also occur in this community. Oak trees commonly found in this community include black oak, canyon live oak (*Quercus chrysolepis*), and interior live oak. Openings and gaps in the canopy of this vegetation
community support shrub species found in the mixed chaparral vegetation community such as manzanita, deer brush, and scrub oak.

The montane hardwood vegetation community is differentiated from the montane hardwood-conifer community by the lack of conifer trees. Canyon live oak is the dominant tree species found in montane hardwood vegetation communities. Interior live oak is also a common component in the montane hardwood community. Understories in these communities are poorly developed with sparse shrub and herbaceous layers.

**Ponderosa Pine and Ponderosa Pine Plantations**

Ponderosa pine vegetation communities are found in scattered patches in the Project area. Areas mapped as ponderosa pine are located in the central and western portions of the Project area. Ponderosa pine is the dominant tree species in this community with black oak typically being a sub-dominant. Buck brush is the most abundant shrub species in the ponderosa pine community in the Project area.

Four small ponderosa pine plantations also occur in the Project area, including one in the eastern portion of the Project area along the pipeline alignment, two in the central portion of the Project area, and one in the west-central portion of the Project area. These areas consist almost exclusively of a ponderosa pine canopy, although the plantation in the west-central portion of the Project area was heavily burned in 2012. The understory in these plantations includes abundant patches of non-native species such as cheatgrass, bull thistle (*Cirsium vulgare*), and common mullein (*Verbascum thapsus*). The west-central plantation also includes heavy patches of yellow star thistle and rattail sixweeks grass.

**Sierran Mixed Conifer Forest**

The Sierran mixed conifer forest vegetation community is found in the eastern through central portions of the Project area. Sierran mixed conifer forest vegetation in the eastern portion of the Project area along the penstock and pipeline alignment is relatively intact, while much of this vegetation community in the central portion of the Project area was heavily burned in the summer of 2012. Additionally, much of the Sierran mixed conifer forest on private land within the Project area has been logged, including areas that have been clear-cut in the recent past. Disturbance by historic and ongoing logging activities, as well as post-fire debris cleanup activities, has been relatively high in many areas resulting in soil horizon displacement, barren substrates, and areas of downed wood.

The Sierran mixed conifer forest community is dominated by varying mixes of white fir (*Abies concolor*), ponderosa pine, incense cedar, Douglas fir, and the occasional sugar pine (*Pinus lambertiana*). Canyon live oak, black oak, Oregon white oak, and bigleaf maple (*Acer macrophyllum*) are also present, particularly at lower elevations and steeper positions in the
eastern portion of the Project area. More mesic sites support a sub-canopy of mountain dogwood or redosier dogwood (*Cornus sericea* ssp. *sericea*), with scattered bigleaf maple. Common shrubs present in this community include several species of manzanita (*Arctostaphylos* spp.), and ceanothus (*Ceanothus* spp.), bush chinquapin (*Chrysolepis sempervirens*), Utah serviceberry (*Amelanchier utahensis*), bitter cherry (*Prunus emarginata*), chokecherry (*Prunus virginiana*), poison oak (*Toxicodendron diversilobum*), Fremont’s silk tassel (*Garrya fremontii*), snowberry (*Symphoricarpos* spp.), Sierra gooseberry (*Ribes roezlii* var. *roezlii*), and mountain pink currant (*Ribes nevadense*). Shrubs found in mesic sites include thimbleberry (*Rubus parviflorus*), wood rose (*Rosa gymnocarpa*), and redbud. Commonly encountered herbaceous species include bracken fern (*Pteridium aquilinum*), bitter dogbane (*Apocynum androsaemifolium*), slender-tube iris (*Iris tenuissima* ssp. *purdyiformis*), California harebell (*Asyneuma [Campanula] prenanthoides*), prince’s pine (*Chimaphila menziesii*), rattlesnake plantain (*Goodyera oblongifolia*), white flowered hawkweed (*Hieracium albiflorum*), Sierra pea (*Lathyrus nevadensis* var. *nevadensis*), mountain sweet cicely (*Osmorhiza occidentalis*), trail plant (*Adenocaulon bicolor*), Indian warrior (*Pedicularis densiflora*), Sierra milkwort (*Polygala cornuta* ssp. *cornuta*), white veined wintergreen (*Pyrola picta*), Lemmon’s catchfly (*Silene lemnion*), and pine violet (*Viola lobata*). Common graminoids include many stemmed sedge (*Carex multicaulis*), Brainerd’s sedge (*Carex brainerdii*), blue wild rye (*Elymus glaucus* ssp. *glaucus*), woodland brome (*Bromus laevipes*), Orcutt’s brome (*Bromus orcuttianus*), California needle grass (*Stipa occidentalis* var. *californica*), and awned melic (*Melica aristata*). In many places where the forest is heavily stocked and the canopy closed, or where shrubs are very thick, the herbaceous understory is mostly lacking. Areas logged in the recent past also exhibit a fair amount of barren ground.

The species composition and density of this vegetation type varies within the Project area. In some areas the canopy is dense and closed; in others it is more open, with shrub species occupying the openings and edges. The boundary between the Sierran mixed conifer forest and montane hardwood conifer vegetation communities is diffuse in some areas, with the two types intergrading between one another.

**Riparian and Wetland**

Riparian and wetland vegetation communities includes those mapped as riparian, wetland, and riverine-montane riparian. Riparian areas include the areas of riparian vegetation along Soap Creek, an unnamed perennial stream channel in the western portion of the Project area, and two intermittent channels in the west-central portion of the Project area. Vegetation in riparian areas includes interior live oak, canyon live oak, California bay (*Umbellularia californica*), white alder (*Alnus rhombifolia*), bigleaf maple, California blackberry (*Rubus ursinus*), Himalayan blackberry, bush chinquapin, and a few scattered willows (*Salix* spp.). Herbaceous vegetation is relatively sparse along Soap Creek and the unnamed perennial stream channel, although native and non-native species including yellow star thistle and rose clover, medusa head, annual dogtail,
monkey flower (*Mimulus* spp.), and lady fern (*Athyrium filix-femina var. cyclosorum*) were some of the species observed in these areas. The overstory vegetation along both of the intermittent channels is relatively sparse. One of the intermittent channels (immediately west of Soap Creek) was in an area that was heavily burned during in 2012 and very few live shrubs and trees remained during field surveys in 2013. Herbaceous vegetation along the intermittent channels includes monkey flower, annual fescues (predominantly *Festuca myuros*), cheatgrass, velvet grass (*Holcus lanatus*), little quaking grass (*Briza minor*) yellow star thistle, bull thistle, scattered rushes (*Juncus* spp.), soft brome, and harvest brodiaea. Himalayan blackberry and cutleaf blackberry were abundant along the southernmost of these two intermittent stream channels.

The riverine-montane riparian vegetation community is located in the eastern portion of the Project area and includes the riparian vegetation associated with the floodplain of SF Battle Creek. Steep slopes and rocky soils prevent extensive riparian habitat from developing in much of this area. Although the canopy cover is partially comprised of the surrounding Sierran mixed conifer forest tree species, dominant woody species along the creek bed and bank itself include white alder with scattered willows. There are also occasional black cottonwood (*Populus trichocarpa*), Pacific dogwood (*Cornus nuttallii*) and bigleaf maple trees. Other woody species include thimbleberry, California blackberry, and California greenbrier (*Smilax californica*). Common herbaceous species include torrent sedge (*Carex nudata*), starflower (*Trientalis latifolia*), slender hairgrass (*Deschampsia elongata*), common mouseear chickweed (*Cerastium fontanum ssp. vulgare*), common horsetail (*Equisetum arvense*), blue wild rye, mugwort (*Artemisia douglasiana*), fragile fern (*Cystopteris fragilis*), musk monkeyflower (*Mimulus moschatus*), English plantain (*Plantago lanceolata*), and American brooklime (*Veronica americana*).

See Section 1.6.1.3 below for discussion of wetlands.

### 1.6.1.2 Noxious Weeds

The Federal Noxious Weed Act of 1974, superseded by the Plant Protection Act (7 United States Code [U.S.C.] 7701), and Executive Order 11312 for prevention and control of invasive species direct all federal agencies to prevent and control the introduction and spread of non-native invasive species including noxious weeds. For purposes of this section, noxious weeds include plants given an “A,” “B,” or “C” rating by the California Department of Food and Agriculture (CDFA 2013) and invasive plants rated as “High,” “Moderate,” or “Limited” by the California Invasive Plant Council (Cal-IPC 2013a). All noxious weeds (as described above) were noted during field surveys of the Project area; however, only those species rated “A” by the CDFA and as “High” or “Moderate” by Cal-IPC were mapped.

Review of Cal-IPC’s Cal WeedMapper database (Cal-IPC 2013b) for the vicinity of the Project identified 60 noxious weeds known to occur in the area. This includes 11 species rated as “high,” 29 species rated as “moderate,” and 20 species rated as “limited” (see Appendix F for
complete listing). Thirty-two noxious weed species were observed during field surveys of the Project area in May, June, and September 2013. This includes 5 species ranked as “high” by Cal-IPC, 15 ranked as “moderate,” and 12 ranked as “limited.” Table 1.6-2 lists these species and briefly describes the locations and abundance in the Project area.

Although noxious weeds were found in the majority of the Project area, the heaviest infestations were found in the western and west-central portions of the Project area along the transmission line ROW. Noxious weeds were most common in annual grassland and disturbed/developed habitats but they were also observed in almost all vegetation communities in the Project area. The most abundant and/or widespread noxious weeds observed in the Project area include yellow star thistle, Himalayan blackberry, medusa head, common wild oats (*Avena fatua*), bull thistle, annual dogtail, cheatgrass, and rattail sixweeks grass.

**Table 1.6-2.** Listed Noxious Weeds Observed within the Project Area

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common Name</th>
<th>Noxious Weed Rating&lt;sup&gt;1, 2/&lt;/sup&gt;</th>
<th>Locations and Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species with a Cal-IPC&lt;sup&gt;1/&lt;/sup&gt; rating of High or Moderate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Avena fatua</em></td>
<td>common wild oats</td>
<td>moderate</td>
<td>Observed in many vegetation communities, although most abundant in annual grassland and blue oak woodland communities. Abundant and widespread in the western portion of the Project area. Often found in dense patches.</td>
</tr>
<tr>
<td><em>Bromus diandrus</em></td>
<td>ripgut brome</td>
<td>moderate</td>
<td>Observed in many vegetation communities in the western and west-central portions of the Project area. Most abundant in annual grassland and disturbed/developed areas. Although found in dense patches, this species was not as common as other noxious brome species.</td>
</tr>
<tr>
<td><em>Bromus madritensis</em> ssp. <em>rubens</em></td>
<td>red brome</td>
<td>high</td>
<td>Observed in many vegetation communities in the western and west-central portion of Project area. Although found in dense patches, this species was not as common as other noxious brome species.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common Name</td>
<td>Noxious Weed Rating1, 2/</td>
<td>Locations and Abundance</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><em>Bromus tectorum</em></td>
<td>cheatgrass</td>
<td>high</td>
<td>Observed in many vegetation communities. Abundant and widespread, especially in the central and western portions of the Project area. Also found in more disturbed areas in the eastern portion of the Project area.</td>
</tr>
<tr>
<td><em>Centaurea melitensis</em></td>
<td>tocalote</td>
<td>moderate / List C</td>
<td>Traces observed in annual grassland, chaparral, and blue oak communities in the west-central portion of the project area.</td>
</tr>
<tr>
<td><em>Centaurea solstitialis</em></td>
<td>yellow star thistle</td>
<td>high/List C</td>
<td>Observed in many vegetation communities, especially in the west-central and western portions of the Project area. Abundant, widespread, and often found in dense patches in these areas.</td>
</tr>
<tr>
<td><em>Cirsium arvense</em></td>
<td>Canada thistle</td>
<td>moderate/List B</td>
<td>Only observed in one location, along the station service line in the eastern portion of the Project area.</td>
</tr>
<tr>
<td><em>Cirsium vulgare</em></td>
<td>bull thistle</td>
<td>moderate/List C</td>
<td>Traces found scattered in various vegetation communities along the length of the Project area. Occasionally found in dense patches, particularly in the eastern portion of the Project area.</td>
</tr>
<tr>
<td><em>Cynosurus echinatus</em></td>
<td>annual dogtail</td>
<td>moderate</td>
<td>Observed in many vegetation communities. Abundant and widespread in the west-central and western portions of the Project area. Also found in more disturbed areas in the eastern portion of the Project area. Often found in dense patches.</td>
</tr>
<tr>
<td><em>Elymus</em> (Taeniatherum) caput-medusae</td>
<td>medusa head</td>
<td>high/List C</td>
<td>Observed in many vegetation communities in the western and west-central portions of the Project area. Abundant and widespread in the western portion of the Project area. Often found in dense patches.</td>
</tr>
</tbody>
</table>
### Table 1.6-2. Listed Noxious Weeds Observed within the Project Area (continued)

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common Name</th>
<th>Noxious Weed Rating(^1, 2)</th>
<th>Locations and Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Festuca (Vulpia) myuros</td>
<td>Rattail sixweeks grass</td>
<td>moderate</td>
<td>Observed in many vegetation communities along the entire length of the Project area. More common in the central and western portions of the Project area. Abundant, widespread, and often found in dense patches.</td>
</tr>
<tr>
<td>Hirschefeldia incana</td>
<td>Mediterranean hoary mustard</td>
<td>moderate</td>
<td>Traces observed in annual grassland in the western portion of the Project area.</td>
</tr>
<tr>
<td>Holcus lanatus</td>
<td>velvetgrass</td>
<td>moderate</td>
<td>Scattered patches observed in Sierran mixed conifer forest and riverine-montane riparian communities in eastern portion of Project area and in riparian, wetland, annual grassland, and Himalayan blackberry communities in west-central portion of Project area.</td>
</tr>
<tr>
<td>Hordeum murinum</td>
<td>foxtail barley</td>
<td>moderate</td>
<td>Traces observed in various vegetation communities in the western and west-central portion of the Project area.</td>
</tr>
<tr>
<td>Leucanthemum vulgare</td>
<td>oxeye daisy</td>
<td>moderate</td>
<td>Traces observed in annual grassland and disturbed/developed areas in the western portion of the Project area.</td>
</tr>
<tr>
<td>Hypericum perforatum</td>
<td>common St. Johnswort</td>
<td>moderate/List C</td>
<td>Observed in various vegetation communities primarily in the western and west-central portion of the Project area. Occasionally found in dense patches.</td>
</tr>
<tr>
<td>Mentha pulegium</td>
<td>pennyroyal</td>
<td>moderate</td>
<td>Traces observed along intermittent stream channels in the west-central portion of the Project area.</td>
</tr>
<tr>
<td>Rubus armeniacus</td>
<td>Himalayan blackberry</td>
<td>high</td>
<td>Primarily found in annual grassland, developed/disturbed, and riparian vegetation communities in the central and western portions of the Project area. An especially dense infestation was observed in the west-central portion of the Project area.</td>
</tr>
<tr>
<td>Rumex acetosella</td>
<td>sheep sorrel</td>
<td>moderate</td>
<td>Traces observed scattered primarily in annual grassland and disturbed areas in the western and west-central portion of the Project area.</td>
</tr>
<tr>
<td>Torilis arvensis</td>
<td>hedge parsley</td>
<td>moderate</td>
<td>Traces observed in the west-central and western portion of the Project area.</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common Name</td>
<td>Noxious Weed Rating$^{1,2}$</td>
<td>Locations and Abundance</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------</td>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><em>Bromus hordeaceus</em></td>
<td>soft brome</td>
<td>limited</td>
<td>Observed in many vegetation communities. Abundant and widespread, especially in the central and western portions of the Project area. Often found in dense patches.</td>
</tr>
<tr>
<td><em>Dactylis glomerata</em></td>
<td>orchard grass</td>
<td>limited</td>
<td>Traces observed in annual grassland, blue oak woodland habitats, and developed areas in the western end of Project area.</td>
</tr>
<tr>
<td><em>Erodium cicutarium</em></td>
<td>redstem filaree</td>
<td>limited</td>
<td>Observed in many vegetation communities in the western and central portions of the Project area.</td>
</tr>
<tr>
<td><em>Lythrum hyssopifolia</em> (L. hyssopifolium)</td>
<td>hyssop loosestrife</td>
<td>limited</td>
<td>Traces observed in the emergent wetland located in the central portion of the Project area.</td>
</tr>
<tr>
<td><em>Marrubium vulgare</em></td>
<td>horehound</td>
<td>limited</td>
<td>Traces observed in the west-central portion of the Project area.</td>
</tr>
<tr>
<td><em>Medicago polymorpha</em></td>
<td>bur medic</td>
<td>limited</td>
<td>Traces observed in annual grassland in the western portion of the Project area.</td>
</tr>
<tr>
<td><em>Plantago lanceolata</em></td>
<td>English plantain</td>
<td>limited</td>
<td>Scattered populations observed, primarily found associated with wetland and riparian areas; however, also observed in annual grassland communities and in disturbed/developed areas.</td>
</tr>
<tr>
<td><em>Poa pratensis</em> ssp. pratensis</td>
<td>Kentucky bluegrass</td>
<td>limited</td>
<td>Observed near emergent wetland and intermittent channel in the west-central portion of the Project area.</td>
</tr>
<tr>
<td><em>Polypogon monspeliensis</em></td>
<td>rabbitsfoot grass</td>
<td>limited</td>
<td>Scattered patches observed in and along intermittent channels in the west-central portion of the Project area.</td>
</tr>
<tr>
<td><em>Rumex crispus</em></td>
<td>curly dock</td>
<td>limited</td>
<td>Scattered patches observed in annual grassland and disturbed/developed areas in the western portion of the Project area.</td>
</tr>
<tr>
<td><em>Trifolium hirtum</em></td>
<td>rose clover</td>
<td>limited</td>
<td>Observed in many vegetation communities. Primarily observed in central and western portions of the Project area, although also observed in disturbed areas in the eastern portion of Project area. Abundant and often found in dense patches.</td>
</tr>
</tbody>
</table>
Table E.1.6-2. Listed Noxious Weeds Observed within the Project Area (continued)

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common Name</th>
<th>Noxious Weed Rating¹</th>
<th>Locations and Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbascum thapsus</td>
<td>common mullein</td>
<td>limited</td>
<td>Scattered patches observed in various vegetation communities in the western portion of the Project area as well as in disturbed areas in the eastern portion of the Project area.</td>
</tr>
</tbody>
</table>

¹/ Cal-IPC Noxious Weed Ratings (Cal-IPC 2013a):
- **High** – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- **Moderate** – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- **Limited** – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

²/ CDFA Noxious Weed Ratings (CDFA 2013):
- **A** – A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment.
- **B** – A pest of known economic or environmental detriment, and if present in California, it is of limited distribution.
- **C** – A pest of known economic or environmental detriment, and if present in California, it is usually widespread.

### 1.6.1.3 Wetland Resources

Wetlands and other waters delineation surveys within the Project area were conducted on May 27–31, June 10–12, and September 18, 2013. Prior to conducting field surveys, the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) online map source (USFWS 2013a) was queried to determine wetlands mapped by the NWI within the Project area. Additionally, the National Hydrography Dataset (NHD) was queried to assess streams mapped within the Project area (USGS 2013).

Only one small (0.07-acre) wetland was observed in the Project area during field surveys in 2013. This wetland was located at the top of an intermittent stream channel that leads into Soap Creek, a perennial stream that flows through the west-central portion of the Project area. The wetland is a small emergent wetland composed of a mix of non-native and native herbaceous species including common yellow monkeyflower (*Mimulus guttatus*), velvet grass, spike bentgrass (*Agrostis exarata*), various species of rush including slender rush (*Juncus tenuis*), straight leaved rush (*Juncus orthophyllus*), and Sierran rush (*Juncus nevadensis* var. *nevadensis*), and scarlet pimpernel (*Anagallis arvensis*).

In addition to the emergent wetlands, 14 non-wetland “waters of the U.S.” were also identified during field surveys. These include 4 perennial streams, 7 intermittent streams, and 3 ephemeral streams. With the exception of one perennial stream, water from all perennial and intermittent channels delineated during field surveys of the Project area eventually flows into...
the Sacramento River, which is considered a Traditional Navigable Waterway by the USACE. Ephemeral drainages identified in the Project area would likely be considered by the USACE as non-relatively permanent waters. However, because these drainages have a physical connection to relatively permanent waters that eventually flow into the Sacramento River, and thus have a significant nexus to a Traditional Navigable Waterway, they would likely be determined to be jurisdictional waters. Therefore, all wetlands and other waters identified in this report will likely be subject to Section 404 of the Clean Water Act as administered by the USACE. Table 1.6-3 below summarizes wetland resources in the Project area.

Wetland and other water resources in the Project area are described in further detail in the *Wetland Delineation Report* prepared for the Project (Appendix G).

### Table 1.6-3. Summary of Wetlands and Other Waters within the Project Area

<table>
<thead>
<tr>
<th>Feature Type</th>
<th>Acres²</th>
<th>Linear Feet within Study Area (feet)²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wetlands</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland A</td>
<td>0.07</td>
<td>NA</td>
</tr>
<tr>
<td>Total Wetlands</td>
<td>0.07</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Other Waters</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perennial Streams</td>
<td>1.82</td>
<td>4,515</td>
</tr>
<tr>
<td>Intermittent Drainages</td>
<td>0.62</td>
<td>6,727</td>
</tr>
<tr>
<td>Ephemeral Drainages</td>
<td>0.05</td>
<td>1,065</td>
</tr>
<tr>
<td>Total Other Waters</td>
<td>2.49</td>
<td>12,307</td>
</tr>
<tr>
<td>Total</td>
<td>2.56</td>
<td>12,307</td>
</tr>
</tbody>
</table>

1/ Does not include Panther Creek; Panther Creek was not delineated due to steep topography of study area.
2/ Note that some acres may differ from technical reports due to slight revisions in Project alignment made January 2014.

### 1.6.2 Project Impacts and Proposed Mitigation

This section describes potential impacts to botanical and wetland resources resulting from construction, operation, and maintenance of the Project. Potential Project-related impacts to botanical and wetland resources may include removal or disturbance, habitat loss or degradation, and introduction and spread of non-native invasive plants, including noxious weeds.

#### 1.6.2.1 Construction Impacts

Vegetation clearing and removal, ground disturbance, trampling or crushing by construction equipment and personnel, and introduction and/or spread of noxious weeds may affect botanical resources during construction of the Project. Habitat fragmentation may occur in areas subject to vegetation clearing for construction of the Project. Ground disturbance and newly
created openings create opportunities for colonization and spread of invasive species and noxious weeds.

Temporary impacts to herbaceous communities, such as annual grassland communities, would result in short-term impacts to these communities because these communities would be expected to return to pre-construction conditions within several years. Temporary impacts to chaparral and forested communities (i.e., montane hardwood, Ponderosa Pine, riparian, and Sierran Mixed conifer) would result in long-term impacts because these communities would take many years to return pre-construction conditions.

Wetland resources in the Project area, with the exception of SF Battle Creek, will be avoided during construction of the proposed Project; therefore, construction impacts to wetland resources in the Project area expected to be minimal. Impacts to the SF Battle Creek will include the installation of a diversion dam and intake structure, as well as a reduction in flows in the affected reach before 100 percent of the water is returned to the stream via the tailrace. The Project will be run of the river, only operating when there is sufficient flow. The extent of in-water work will include the construction of the diversion dam.

1.6.2.2 Operation and Maintenance Impacts

Vegetation maintenance of the pipeline/penstock, station service line, and transmission line ROWs during operation of the Project will likely result in the permanent conversion of some forested areas to herbaceous or shrub habitats. Impacts to wetland resources in the Study Area are not expected. Additionally, operation and maintenance activities could result in the spread of noxious weed species within the Project area via transport on maintenance equipment and personnel.

1.6.2.3 Proposed Mitigation

The following mitigation measures would contribute to the protection of wetland and botanical resources, including populations of and habitat for special-status species, in the Project area. Additional measures related to special-status species are included in Section 1.12.

- Limit ground-disturbing activity and vegetation clearing to the smallest footprint possible, allowing for safe construction of the Project.
- Delineate the limits of construction, work areas, and multipurpose areas with flagging, fencing, and/or stakes, and prohibit ground disturbance outside of these limits.
- Preserve vegetation in place to the extent possible.
- Implement measures to prevent the spread of invasive species and noxious weeds.
- Implement BMPs to reduce erosion and sedimentation, including installation of erosion and sediment control structures (e.g., silt fence) prior to ground-disturbing activity,
regular inspection and repair of erosion and sediment control structures, and
 revegetation of temporarily disturbed areas as soon as possible with habitat-specific
 agency-approved seed mixes once ground-disturbing activities are complete for a given
 area.

- Ensure that materials from Project construction (e.g., soil, rock, and other debris) are not
  discharged to surface waters nor deposited where they could be eroded and carried to
  the stream by surface runoff or high stream flows. All construction operations will be
  performed under the current stringent Stormwater Pollution Prevention Program as
  defined by the State of California.

- Surface permanent roads with gravel to a depth and quantity sufficient to maintain a
  stable road surface. Disturbed soil areas and fill slopes will be stabilized.

- Implement BMPs for spill prevention, containment, and countermeasures.

- Ensure there is no discharge of petroleum products, cement, cement washings, or other
  construction materials into surface waters.

- Avoid sensitive aquatic resources such as streams, wetlands, and ponds to the extent
  possible. Use existing stream and wetland crossings where possible.

- Where stream or wetland crossings are required, install crossings in compliance with
  state guidelines for riparian and terrestrial habitat connectivity. Reclaim temporarily
  disturbed stream and riparian habitat through restoration of preconstruction conditions
  and riparian plantings and/or seeding, where applicable, with agency-approved seed
  mixes.

- Ensure that construction activities in flowing water in the stream bed occur only as may
  be necessary to construct Project components and that such activities are in full
  compliance with all agency regulations and permits, including the Streambed Alteration
  Permit that will be obtained from the CDFW for work necessary in, or adjacent to, the
  streambed.

- Use a silt curtain or other water quality barrier if necessary during in-water work to
  minimize the potential for turbidity and meet state water quality requirements during
  construction.

- Employ biological monitoring personnel during construction to ensure that measures to
  protect biological resources are implemented appropriately.

### 1.7 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) requires the FERC to take into
account the effect of licensing a hydropower project on any historic properties. “Historic
Properties” are defined as any prehistoric or historic district, site, building, structure, or object
that is included in or eligible for the inclusion in the National Register of Historic Places (NRHP), including artifacts, records, and material remains related to such a property or resource 16 U.S.C. Section 470(w)(5).

A cultural resource inventory and report, Cultural Resource Inventory, Lassen Lodge Hydroelectric Project FERC License No. 12496, Tehama County, California (non-confidential version included as Appendix I), was undertaken to assist Rugraw (FERC’s non-federal representative for initiating consultation) with this final License Application and to assist in complying with the requirements of Section 106 of the NHPA, as amended, and its implementing regulations 36 CFR 800. In addition, this Project will be subject to state and local county regulatory requirements. As such, the study was also conducted to comply with the California Environmental Quality Act (CEQA).

The goals of the inventory and report are to identify and describe cultural resources located within the project Area of Potential Effect (APE); provide a cultural context for the APE; identify any adverse effects to historic properties (NRHP) or historic resources (California Register of Historic Resources [CRHR]) that may occur as a result of the proposed Project; and develop recommendations to mitigate any adverse effects. A non-confidential copy of the Cultural Resources Inventory report for the Project is provided in Appendix I.

1.7.1 Area of Potential Effect

See Appendix I – Cultural Resource Inventory, Appendix A, for maps that depict the APE for the Project. For archaeological and architectural resources, the indirect APE generally includes the direct APE as well as site boundaries and historic view sheds within the Project study area. If a known historic property is located in the APE, the entire property is included in the APE.

The APE was delineated in an effort to gather information and ensure the identification of significant cultural resources that are listed in or eligible for inclusion in the NRHP and CRHR that may be directly or indirectly affected by the Project.

On August 28, 2013, Rugraw sent a letter to the State Historic Preservation Office (SHPO) requesting concurrence of the direct and indirect APE. The SHPO replied by letter and email on October 3, 2013, and concurred with the delineation of the APE for this undertaking (see Appendix I, and its Appendix B). Since that date, the APE has been revised and a letter submitted with the Cultural Resources Inventory requesting concurrence of the APE. The revised and now current APE is reflected in the maps provided in Appendix A of Appendix I. The APE was established using methodology consistent with similar type projects. It consists of surfaces and depths that will be disturbed within the Project footprint. The direct APE includes the following and is illustrated in Appendix I:

- Diversion and Intake Structure: 2 acres
- Powerhouse: 3.5 acres
- Multipurpose Areas:
  - 1: 0.4 acre
  - 2: 0.6 acre
  - 3 (substation and multipurpose – includes station service to switchyard): 0.8 acre
- Transition Structure: 1 acre
- Pipeline and Penstock Route: 120 feet width by 2.4 miles length
- Potential Transmission Tower Location: 2.9 acres
- Transmission Line Route: 120 feet width by approximately 12 miles length
- Station Service Line to Powerhouse: 120 feet width by approximately 0.5 mile length
- Transmission Line Pulling areas (within transmission line APE)

All access roads (as discussed in Section 1.2.10 of the Cultural Resources Inventory) consist of existing, currently maintained, and active SPI and PG&E access roads and county roads and will not be modified, with the exception of improvements to SPI logging roads 120A7 and 100A.

A new permanent road required for access to the powerhouse from existing road 120A7 will be constructed within the powerhouse portion of the APE as described above (see Appendix I).

The proposed vertical APE extends from approximately zero feet to a maximum of 60 feet above the existing ground surface to approximately 1 foot to a maximum of 20 feet below ground surface (depending on the height and depth of Project facilities).

1.7.2 Environmental Setting

This section provides a contextual overview of the cultural setting of the Project area.

1.7.2.1 Prehistoric Context

The cultural temporal framework for the southern Cascade foothills is based on early archaeological investigations by Baumhoff (1955, 1957) at Kinsley Cave (CA-TEH-1) and Payne Cave (CA-TEH-193). Baumhoff’s two-phase sequence—early Kingsley Complex and later Mill Creek Complex—was later expanded and refined by archaeological investigations by other scholars (Johnson and Theodoratus 1984; Greenway 1982; Wiant 1981). Based on their investigations and analysis of materials recovered from a variety of prehistoric open sites and rock shelters, a five-phase chronological sequence was developed. The five-phase sequence is briefly presented below and includes the Deadman Complex, Kingsley Complex, Dye Creek Complex, Mill Creek Complex, and the Proto-Historic Period (Ethnographic Yana).
Deadman Complex (4500 BP – 3000 BP)
To date, the Deadman Complex is the earliest recognized complex. The artifact assemblage for this sequence is characterized by large side-notched and stemmed projectile points and unifacially flaked leaf-shaped “foliates” (Greenway 1982). Flake stone tools were primarily manufactured from basalt. Groundstone artifacts include metates and manos. Beads and pendants are also represented and include large dish-shaped Haliotis shell beads, scoop Olivella shell beads, and large triangular Haliotis pendants. The presence of beads during this complex suggests an established trade network with groups from costal settings. Subsistence consisted of various plant resources and large to medium sized game. Deadman Complex site types include rock shelters and open sites. Sites exhibiting evidence from this complex have been located near Mill and Dye Creeks in Yahi and Southern Yana territory.

Kingsley Complex (3000 – 1500 BP)
The artifact assemblage for the Kingsley Complex includes large-stemmed and corner-notched projectile points made primarily from basalt. Groundstone artifacts include metates and shaped rectangular hand stones, and hopper mortars and flat-ended pestles. The use of mortars and pestles suggest the introduction of acorn processing as a food resource during this time. Other cultural items incudes Olivella shell beads, spatulate and bone tools. Single- and multi-family structures were used during this time. Burials are tightly-flexed, contained ceremonial items, and typically buried at depths ranging from 60 to 140 cm (some associated with rock cairns). Located adjacent to the APE, site CA-TEH-1490 was assigned to this complex. Projectile point typologies analyzed from surface observations and excavations at site CA-TEH-1490 suggest the site was occupied during the late Kingsley and middle Dye Creek Complexes by the Southern Yana people (Hamusek 1988). Cultural components identified at CA-TEH-1490 include a hearth, fauna and floral remains, lithic flakes, bifaces, 30 diagnostic projectile points, and five pieces of ground stone.

Dry Creek Complex (1500 – 500 BP)
The characteristic artifacts for the Dry Creek Complex include medium- to large-sized corner-notched, side-notched, serrated styles, and types similar to the Gunther Barbed series projectile points. During this period, obsidian (predominately Tuscan source) and chert become the primary raw material used for tool manufacture. Several Tuscan obsidian sources are located within approximately 15 to 20 miles of the APE (Hamusek-McGann 1995). Groundstone implements include the hopper mortar and flat-ended pestle, and slab metates and manos. Rectangular and barrel Olivella shell beads, large circular Haliotis ornaments, perforated freshwater clamshell ornaments, and deer ulna bone artifacts are also present. Burials are typically tightly-flexed and buried to a depth of 60 to 120 cm. The Dry Creek Complex is represented by a high density of archaeological sites identified along the Mill, Antelope, Deer, and Dye Creeks within Yana territory (Watts and Dugas 1998). Radiocarbon assays of hearth
features and obsidian hydrations measurements at the Jelly Mound site CA-TEH-1783 (approximately six to eight miles southwest of the APE) produced dates consistent with the Dry Creek Complex (Sundahl 2001). As noted above, site CA-TEH-1490 is also associated with this complex.

**Mill Creek Complex (AD 1500-1845)**

The artifact assemblage for the Mill Creek Complex incudes Desert series side-notched, Southern Cascade serrated, and small triangular projectile points made primarily from obsidian. Rock shelters along Mill Creek, dating to this complex, have yielded arrow fragments made from elderberry (Watts and Dugas 1998). Groundstone implements include the hopper mortar and flat-ended pestle, and slab metates and manos. Bead types include clams shell disk beads, whole spire-lopped Olivella shell beads, Glycymeris shell beads, and magnesite cylinder beads. Twined and coiled basketry and twined cordage are also present. Additional characteristics include pitted boulder petroglyphs, tightly-flexed burials, and small, single-family structures 3 to 4 meters diameter rock rings with bush, deerskin, or bark. Large earth-covered communal or ceremonial structures are also noted (Johnson 1994).

**Proto-Historic Period (AD 1845-1911)**

The artifact assemblage for the Proto-Historic Period is associated with historic contact and includes traditional type artifacts fashioned from Euro-American introduced refuse materials (e.g., glass and metal objects) such as glass projectile points, glass scrappers, and square iron nail harpoon toggles. Euro-American trade goods also appear during this period such as glass beads and white porcelain trade beads. Other characteristics include small triangular serrated obsidian projectile points, large clam shell discs, white spire-lopped Olivella shell beads, pine nut beads, Glycymeris and Dentelia shell beads, whole Haliotis shells, magnesite cylinders, wooden tubular pipes, twined basketry, slab metates, manos, hopper mortars, and flat ended pestles. Small, single-family structures 3 to 4 meters in diameter covered with bark or brush, pitted boulder petroglyphs, and tightly-flexed burials and cremations are also noted for this complex.

**Prehistoric Environmental Setting**

The Southern Cascade region has experienced environmental change from the late glacial Pleistocene to post glacial climates of the Holocene. Prior to 12,500 years ago, the climate was cooler and vegetation consisted of a sage-brush steppe. As conditions grew warmer, the vegetation transitioned to pine-dominated forest from 12,500 to 3,100 years ago, finally transitioning to the fir forest of today (West et al. 2007:30).

Vegetation communities were treated with deliberately set fire by the Native Americans to encourage growth of plant resources used for food and fiber (basketry, twine, etc.), improve
hunting conditions, gathering grasshoppers and other insects, and ceremonial purposes (Schultz 1954; Lewis 1993).

1.7.2.2 Ethnohistoric Context

The proposed Project area is situated within the ethnographic region of the Hokan-speaking Yana and Yahi (Kroeber 1925; Johnson 1978). They resided in the upper Sacramento Valley within the foothills of the eastern Cascade Range. Their territory extended along the Pit River to the north, Deer and Rock Creek to the south, and the upper reaches of the Montgomery, Cow, Battle and Deer Creek watershed to the east (Kroeber 1925; Johnson 1978). There is some uncertainty regarding the Yana and Yahi western boundary but it is generally thought to be within the foothills east of the Sacramento River. Although it has been suggested the Southern Yana and Yahi may have held seasonal fishing locations along the banks of the Sacramento River (Sapir and Spier 1943). The Yana and Yahi were separated into four linguistic divisions: Northern, Central, Southern, and Yahi (Johnson 1978:361; Heizer and Elsasser 1980:17).

Specifically, the Project area is within the Southern Yana territory. As defined by Kroeber (1925:339), the Southern Yana lived along Battle Creek and their territory extended south encompassing the Payne and Antelope Creek drainages. Pre-contact Yana and Yahi population estimates vary at approximately 1,100 to 3,000 individuals, with the Southern Yana and Yahi population estimated at 500 to 800 individuals (Kroeber 1925; Sapir and Spier 1943; Johnson 1978; Johnson 2003).

The Southern Yana and Yahi occupied village and campsites along drainages within the foothills and mountains of their territory. Their dwellings varied from natural caves and rock shelters to small wooden pole-frame supported conical bark-covered hut with a circular depressed floors or dome-shaped, pole-supported huts with branches, brush, animal skins, or other suitable covering (Hamusek 1988). Simpler thatched summer and temporary structures were often used during hunting and gathering excursions (Johnson 1978).

Greenway (2004:125-127) summarizes Johnson’s (1978, 2003) Yana and Yahi hunting and gathering subsistence pattern and references it as the Foothill Model. In summary, this model suggest the primary Yana and Yahi subsistence resources included acorn, deer, salmon, bulbs and seeds. The Foothill Model suggests that during the winter (September to Late May/early June) the Yana occupied villages below 3,000 feet in elevation. Winter villages contained several households and held the largest population. The Yana would hunt deer, fish for salmon and gather acorns from resource areas near the village. Depending upon the time of year, smaller family units would leave the village site for a few days and travel to smaller campsites to gather acorns. The acorns would be brought back to the village and then processed for storage or consumption. In the spring, small family units would venture out to low-elevation foothill campsites to collect bulbs, greens, and small seeds and to fish for salmon. Evidence of this type
of site is indicative of ground stone implements. During the summer months, the Yana would move to higher mountain elevations to hunt deer that had since migrated to higher elevations and to collect bulbs, grasses, and nuts. It also provided an opportunity to collect other resources such as Kelly Mountain Obsidian and basalt for tool manufacture. By the fall, the Yana would return to the lower elevation campsites to gather acorns, pine nuts, fish for salmon, and hunt game (deer), eventually returning to the winter village sites.

Wiant (1981) provides a slightly different subsistence model that Greenway (2004) terms the Alternative-Model. This model postulates that Yana primary resources include acorn, salmon, bulbs, seeds with the emphasis on salmon fishing and acorn gathering. Greenway’s research at Dead Man’s Cave (CA-TEH-290, Yahi Yana territory) concluded that although both subsistence models tend to have some overlap, the Alternative-Model’s use of salmon as a primary resource was not supported by the archaeological data collected.

Material resources for domestic use and tool manufacture were also readily available in the Southern Yana territory. A variety of vegetal material was used for basket making, cords, and ropes. Local materials were also used for flat slab hopper mortar, unshaped unifacially used mano and slab, or boulder metates (Johnson 1978). Mahogany was used for digging sticks and bows, as was juniper, hazel, and yew for the latter. Antler and bone were used for flakers, wedges, awls, harpoon toggles, fish gorges and hooks, pendants, beads, needles, bird bone whistles, and gambling pieces of incised rodent teeth (Johnson 1978; Hamusek 1988; Wiant 1981). Local material for lithic tools primarily consisted of basalt and andesite with some chalcedony, petrified wood, and occasional nodules of Tuscan obsidian (Johnson 2003; Hamusek 1988). Although it is noted that the Yana were seldom on good terms with surrounding tribes for any extended amount of time, some materials such as obsidian, shell beads, and shaped pestles were obtained by trade. Neighboring tribes of the Yana and Yahi included the Wintu to the west, the Achumawi to the north, the Atsugewi, and northeastern Maidu to the east, and the Northern Maidu to the south. Relations with these tribes varied at any time with each Yana group.

1.7.2.3 Historic Context

Early trappers and fur traders explored the area that would become Tehama County in the 1830s to hunt beaver. This period saw an increase in population in the area and some early settlers of the county were granted land by Mexican Governor Micheltorena in 1844. Portions of present-day Tehama County were part of seven different Mexican land grants of the 1840s: Rancho de los Molinos, Rancho las Flores, Rancho Primer Canon or Rio de Los Berrendos, and Rancho de la Barranca Colorado, Rancho Capay, Rancho Bosq Jo, and Rancho Saucos (Tehama County 2011; Lewis Publishing Company 1891). The Tehama County Ranchos were located on either side of the Sacramento River. Property closer to Mount Lassen to the east was not
included in the Mexican land grants. The APE was not part of the land grants, which were clustered on the river. The closest one is Berrendo, just outside of Red Bluff, and it is about 30 miles west of the APE.

California was made a state of the United States in 1850, and Tehama County was formed in 1856. The 1848 discovery of gold brought a wave of fortune seekers and entrepreneurs to California and the project region. By that time agriculture, ranching, and logging were the primary economic mainstays of the area. The logging industry, during its early stages, attracted residents from European, Chinese, and Mexican descent to the area (Tehama County 2011).

Sawmills were established along Payne’s Creek and Digger Creek in the late 1850s and early 1860s as part of the development of the local lumber industry. Homesteaders soon followed in the Digger Creek area, beginning ranching operations in the 1860s. By the late 19th century there was a settlement along Digger Creek named Manton. A town sprang up during the same era along Paynes’ Creek, but the area to the east of the settlement between Paynes’ and Battle Creeks was settled later than other areas. By 1878, land in the vicinity had not yet been sectioned (Shackleford and Nugent 1878). The first property owner in this area appears to have been a small amount of settlers and the Central Pacific Railroad, which patented much of the area in 1895.

Settlers George W. Hazen (1829-1910) and his brother, Wheeler Edward Hazen (1836-1902) were land owners and farmers in Manton. The Hazen brothers and the Hazen family owned land in Manton as early as the 1870s according to land patent entries and historic maps (see Table 2-5) (GLO 1875; Luning 1903). George W. Hazen owned 320 acres, and Wheeler Edward Hazen owned 922 acres and had an apple orchard (Tehama County 2013; Oakley-McFarlin 2008). The 1875 historic General Land Office (GLO) plat map illustrate a structure labeled George W. Hazen’s House in T29N, R1E, Section 2, and the 1903 Tehama County Map lists his name as a property owner just south of Hazen Road in T30N, R1E, Section 34 (GLO 1875; Luning 1903).

Both the Manton and Payne’s Creek areas were home to Civilian Conservation Corps (CCC) camps in the 1930s. These camps housed the men who worked on the federally funded forestry efforts and the construction of the road now known as Ponderosa Way that were undertaken in the Manton area (Hislop and Hughes 2007).

**The Lumber Industry in Tehama County in the Late 19th and Early 20th Century**

A wide variety of tree species and forests that extended northward from the Sierras into the Oregon border became a source of economic importance to the area that is now Tehama County. Early trading companies in California in the 1820s began shipping lumber from California to far flung locations such as Alaska and closer regions such as Sacramento. Logging
was a vital industry in California before the Gold Rush of the 1840s. The coming of the Gold Rush resulted in an even greater demand for forest products for fuel wood, construction, and mining purposes (Kraft and Woodrum 2005). This demand led to the establishment of saw mills in the northern Sierras and Southern Cascades, as well as Tehama County.

There were two major lumber companies in Tehama County—the Sierra Flume and Lumber Company and the Sierra Lumber Company (successor to the Sierra Flume and Lumber Company). Between 1876 and 1907, these two companies built a large and complex lumber operation that included miles of flumes, several saw mills, factories, and lumber yards in Tehama County. The Sierra Flume and Lumber Company acquired the Blue Ridge Flume and Lumber Company, the Empire Company, as well as other small lumber companies during its history.

The most important mill constructed by the Sierra Flume and Lumber Company was built in 1876 and was the “New” Champion Mill. The area around the mill grew into a community that was named Lyonsville, after its first superintendent, Darwin B. Lyon (Tehama County 2011). The Lyonsville community eventually consisted of social halls, a post office, school, warehouses, and hotels and was settled upon an escarpment between the north and south fork of Antelope Creek. The town was abandoned by 1918. Segments of the Last Chance Ditch within the APE appear to be associated with the New Champion Mill. The sale of the Blue Ridge Flume Company to the Sierra Flume and Lumber Company included 44 miles of flume from the Blue Ridge Flume and Lumber Company which was constructed in 1872 by R.H. Campbell to bring lumber from several mills in the Manton area to the Sacramento River (Kraft and Woodrum 2005; Tehama County 2011). The Sierra Flume and Lumber Company operated from 1875 to 1878, and opened the New Champion Mill in 1876. In 1878, the Sierra Flume and Lumber Company was purchased by the Sierra Lumber Company, and it operated under this name until 1907. In 1902, Sierra Lumber Company started the Diamond Match Company (Hutchinson 1956).

**Early Ditches and Flumes in Tehama County**

While steamboat and wagon roads were used to transport lumber to the larger commercial area of California, a less expensive means of getting the lumber from the saw mills in Tehama County to the valley floor was used: flumes and ditches. Most of the well-known ditches and flumes of Tehama County were constructed and used in the 1860s through the 1870s. These are the “Blue Ridge Flume” and the “Empire Flume.” These flumes were constructed and/or owned by the Sierra Flume and Lumber Company and the Blue Ridge Flume Company. Flumes, often constructed in a V shape, carried lumber from saw mill operations to various end points where it was either rafted down local rivers to other areas, like Red Bluff, or to the Sacramento River where it would be loaded on to ships bound to other regions. Prior to the construction of logging railroads in the 1870s, which were built to moved logs to saw mills inland and along the
coast in the 1870s, ditches and flumes were an inexpensive and popular means of transporting lumber.

There are many historic settlements, structures, features, trails, and associated roads dating from the 1860s to the early 1900s in the region, most of which were constructed to support the lumber industry and travelers going to local tourist locations or for the transportation of products. Wagon stops and lodges sprang up in the 1910s and 1920s and continued to be popular for the next several decades as the automobile became more commonplace and Tehama County and the eastern Sierras and Cascades grew popular for hiking, fishing, hunting, and relaxation. The popularity of automobiles and the need to transport local products to other areas within the state also increased the need for better paved and graded roads, such as a portion of the old, abandoned SR 36, which runs through the APE.

Roads and Lodges in Tehama County

State Route 36

Early transportation routes in the 1850s in Tehama County were wagons roads and stage coach lines, which traveled from Red Bluff to Sacramento River communities. By the 1870s railroads lines were established in the county and used to transport passengers and goods, however local roads were still used, especially with popularity of the automobile, beginning in the 1910s. During the late 1890s in California, the state highway system was formed and the State Bureau of Highways recommended a highway constructed from Sacramento to Red Bluff (Hardwick and Holtgrieve 1996). Most of these early roads were not paved with a hard surface but instead were graded and rough until 1916 and 1917, when roads in Tehama County were paved (Kraft and Woodrum 2005).

The history of roads in eastern Tehama County begins with the County Wagon Road, constructed in 1863. This road was built from Red Bluff to Battle Creek Meadows, over Morgan Summit, across Mill Creek and through Tyler Meadows, now known as Childs Meadows (Serr no date). The construction of this road led to campers and vacationers to escape the summer heat to the mountainous area of east Tehama County. In 1907, construction of a state highway given Legislative Route Number (LRN) 36 was constructed from present-day Oroville southeast to what is Collins Lake (California Highways 2012). By 1913, LRN 36 was extended farther east-west, following the alignment of the Old County Wagon Road. In 1921, LRN 36 was paved and its general alignment followed the present-day alignment of SR 36 as it runs adjacent to Lassen Lodge at Paynes Creek. By 1926, SR 36 appears on historic maps having been extended through the eastern portion of Tehama County (Luning 1926). In the 1920s, 1935, and 1941, SR 36 appears to have been located slightly to the north of its current alignment in places. SR 36 was completed in 1937 and has undergone improvements.
The SR 36 alignment appears to follow routes listed as State Highway 21 from Red Bluff to Mineral in 1934 (State of California 1934). Prior to the current highway naming conventions before 1963, portions of SR 36 through Tehama County were labeled LRN 3 and LRN 35. After 1964, segments of highways were combined and naming conventions were changed. Regardless of the condition of the road, during its wagon road period as well as its paved highway alterations, the road was crucial for travelers vacationing in the mountainous areas of east Tehama County.

**Ponderosa Way**

In 1929, CAL FIRE proposed a plan to create a continuous firebreak at the western edge of the Sierra Nevada. In the early 1930s, CAL FIRE began to prioritize the protection of valuable timber resources in mountainous regions (Thornton 1995). In keeping with this focus, the route for the firebreak was planned to roughly follow the line between chaparral and timber. It was intended as permanent fire defense for National Forest lands. Implementation became possible in 1933, when the federal government instituted the unemployment mitigation program that became known as the CCC program. The largest project undertaken by the CCC in California was the construction of Ponderosa Way, also known as the Ponderosa Fire Break and Truck Trail. The route was planned to cover 768 miles, from the Shasta Bear lookout through Tehama County and south to the Kern County border near Bakersfield. The project was surveyed in 1933, and by May 1934, 440 miles of the route had been completed (Otis et al. 1986). Where possible, the route followed existing roads and trails, which gave rise to its frequent and confusing name changes. Other sections required the use of jackhammers and dynamite to carve the roadbed out of bedrock. Ponderosa Way has been called “the longest invisible federal road in America” (McCubbins 2010).

**Traveler’s Stops and Lodges in East Tehama County**

The community of Paynes Creek was established in 1870 and is roughly 20 miles northeast of Red Bluff, approximately 11 miles east of the Project APE. There was a sawmill there in the late 1850s at Mill Creek, and eventually a stage stop and wagon routes were established between Red Bluff and Manton. The most well-known of these stage and wagon stops were in Mineral (Mineral Lodge), located on present-day SR 36, about 35 miles east of Red Bluff. Other historical wagon stops include one at Paynes Creek at Inskip Lodge, which contained a post office, store, gas station, and a dance hall (Tehama County 2011), and another at Morgan Springs, near Mill Creek. These wagon stops often had summer cabins, motels, and stores, which were popular with travelers on their way to Lassen Volcanic National Park or they were a destination spot in and of themselves. Some of these wagon stops grew into small towns and communities with schools and permanent residents; other stops along the Old County Wagon Road and later SR 36 were only places to rest or refuel before continuing on the journey. The lodge has had
different names over the years and in local histories, but is most commonly known as Lassen Lodge.

1.7.3 Identification of Historic and Archaeological Resources

1.7.3.1 Archival Review

A cultural resource literature review was conducted at the Northeast Information Center (NEIC) (I.C. File #D12-103) of the California Historical Resource Information System at California State University, in Chico, California on December 11, 2012. An updated and expanded record search was conducted at the NEIC (I.C. File#D13-90) on August 8, 2013. The record search focused specifically on the proposed Project APE and the Project study area, a 1-mile buffer around the APE. In addition, historic maps and land patents were reviewed. The records search revealed a total of 24 previous cultural resources investigations have been conducted within the Project study area. A total of 17 archaeological resources have been previously recorded in the Project study area. Of these, two prehistoric sites and two historic sites were identified within the APE. See Appendix I, Section 2.0, Tables 2-1 and 2-2 for archival review results.

Native American and Stakeholder Consultation

Tetra Tech contacted the Native American Heritage Commission (NAHC) by e-mail on Rugraw’s behalf on December 17, 2012, to request an updated sacred lands file search and a list of Native American contacts with interest in the Project study area. The NAHC responded on January 22, 2013, that no Native American resources were identified within the project area.

On April 30, 2013, a letter and email were sent out by Tetra Tech, on Rugraw’s behalf, to each of the parties provided by the NAHC detailing the Project and requesting information regarding potential Native American resources within the study area. Mr. Hayward Sr. of the Redding Rancheria contacted Tetra Tech to discuss potential cultural resources in the study area and his concerns regarding salmon in the creek. Mr. Hayward was unable to continue consultation regarding the Project and delegated the consultation to Ms. Beverly Ogle. Ms. Ogle contacted Tetra Tech on September 12, 2013, to discuss the project and concerns regarding cultural resources within Southern Yana territory and the APE. Ms. Ogle and Ms. Farrell (Tetra Tech) conducted a field visit of the southern eastern portion of the APE at SF Battle Creek on October 22, 2013. To date, no traditional cultural resources have been identified within the APE. See Appendix I, Appendix E for Native American and stakeholder consultation letters and memos.

1.7.3.2 Pedestrian Archaeological and Architectural Surveys

An archaeological and architectural pedestrian survey was conducted to determine the presence or absence of cultural resources within the APE. Archaeological Fieldwork was conducted from
August 12 through 23, 2013 and Architectural Fieldwork was conducted on August 22 and 23, 2013. These efforts identified nine archaeological resources and eight architectural resources within the APE. Table 1.7-1 lists the recommendations for NRHP eligible, NRHP unevaluated/potentially eligible, and NRHP not eligible resources within the APE and management recommendations.
Table 1.7-1. Archaeological and Architectural Resources Identified within the Lassen Lodge Hydroelectric Project

<table>
<thead>
<tr>
<th>Temporary Resource #</th>
<th>Trinomial/Primary #</th>
<th>Resource Type</th>
<th>Description</th>
<th>NRHP/CRHR Eligibility Recommendations</th>
<th>Within APE</th>
<th>Current Project Impacts</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previously Recorded Archaeological Sites</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--</td>
<td>CA-TEH-1358/H</td>
<td>Prehistoric</td>
<td>Lithic and tool scatter, midden, and possible burials.</td>
<td>Unevaluated/Potentially Eligible</td>
<td>Yes-Dirt Access Road</td>
<td>Yes, continued use (i.e., driving over road) of the dirt access road would impact site.</td>
<td>Recommend avoidance measures via capping of the roads prior to construction of the Project. Protection measures will be implemented as outlined in the Historic Properties Management Plan (HPMP).</td>
</tr>
<tr>
<td>--</td>
<td>CA-TEH-1490</td>
<td>Prehistoric</td>
<td>Lithic and tool scatter, site surface collected, tested and excavated in 1988</td>
<td>Unevaluated/Potentially Eligible</td>
<td>Yes-Dirt Access Road</td>
<td>Yes, continued use (i.e., driving over road) of the dirt access road would impact site.</td>
<td>Recommend avoidance measures via capping of the roads prior to construction of the Project. Protection measures will be implemented as outlined in the HPMP.</td>
</tr>
<tr>
<td>--</td>
<td>CA-TEH-1824H</td>
<td>Historic</td>
<td>Water conveyance system for logging-Last Chance Ditch</td>
<td>Recommended Not Eligible</td>
<td>Yes-Access Road, Penstock Pipeline</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>--</td>
<td>CA-TEH-2041H</td>
<td>Historic</td>
<td>Small sawmill remains and refuse scatter</td>
<td>Recommended Not Eligible</td>
<td>Yes-Adjacent to Penstock Pipeline and access road</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>--</td>
<td>CA-TEH-2113H</td>
<td>Historic</td>
<td>Can scatter</td>
<td>Recommended Not Eligible</td>
<td>Yes-Adjacent to Access Road and overhead Transmission Line</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
</tbody>
</table>
### Table 1.7-1  Archaeological and Architectural Resources Identified within the Lassen Lodge Hydroelectric Project (continued)

<table>
<thead>
<tr>
<th>Temporary Resource #</th>
<th>Trinomial/Primary #</th>
<th>Resource Type</th>
<th>Description</th>
<th>NRHP/CRHR Eligibility Recommendations</th>
<th>Within APE Project Impacts</th>
<th>Current Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Newly Identified Archaeological Sites</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LLHEP-J F-01</td>
<td>CA-TEH-2495</td>
<td>Prehistoric</td>
<td>Lithic and tool scatter</td>
<td>Unevaluated/Potentially Eligible</td>
<td>None, site will be avoided by construction or operation and maintenance (O&amp;M) activities.</td>
<td>Avoidance-Orange hazard fencing. The site will be avoided during construction and O&amp;M activities. Protection measures will be implemented as outlined in the HPMP.</td>
</tr>
<tr>
<td>LLHEP-J F-04H</td>
<td>CA-TEH-2496H</td>
<td>Historic</td>
<td>Refuse Scatter</td>
<td>Recommended Not Eligible</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>LLHEP-SK-01</td>
<td>CA-TEH-2497</td>
<td>Prehistoric</td>
<td>Lithic Scatter</td>
<td>Unevaluated/Potentially Eligible</td>
<td>None, the paved road that transects the site will not be altered or changed for the Project construction or O&amp;M activities.</td>
<td>Avoidance. Road transecting site will not be altered. Protection measures will be implemented as outlined in the HPMP.</td>
</tr>
<tr>
<td>LLHEP-SK-02H</td>
<td>CA-TEH-2498H</td>
<td>Historic</td>
<td>Refuse Scatter</td>
<td>Recommended Not Eligible</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>2LLHEP-J F-01H</td>
<td>CA-TEH-2520H</td>
<td>Historic</td>
<td>Refuse Scatter</td>
<td>Recommended Not Eligible</td>
<td>None, site is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
</tbody>
</table>
# Archaeological and Architectural Resources Identified within the Lassen Lodge Hydroelectric Project (continued)

<table>
<thead>
<tr>
<th>Temporary Resource #</th>
<th>Trinomial/Primary #</th>
<th>Resource Type</th>
<th>Description</th>
<th>NRHP/CRHR Eligibility Recommendations</th>
<th>Within APE Project Impacts</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Previously Recorded Architectural (Building, Structure, and Object [BSO]) Resources</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--</td>
<td>P-52-002474</td>
<td>Historic</td>
<td>Road: Ponderosa Way</td>
<td>Recommended Eligible</td>
<td>Yes-Dirt Access Road</td>
<td>The road will not be altered or changed for the Project construction and O&amp;M activities. Protection measures will be implemented as outlined in the HPMP.</td>
</tr>
</tbody>
</table>

| **Newly Identified Architectural (BSO) Sites** |
| LLHEP-J F-05 | CA-TEH-2499H | Historic | Road: Former SR 36 | Recommended Eligible | Yes-Dirt Access Road | The road will be used for construction but will not be altered or changed for the Project construction and O&M activities. Protection measures will be implemented as outlined in the HPMP. |
| LLHEP-J F-06 | CA-TEH-2500H | Historic | Structures Lassen Lodge | Recommended Not Eligible | Yes-Visual Access Road APE | None, site is recommended as not eligible to NRHP/CRHR. |
| LLHEP-J F-09 | CA-TEH-2501H | Historic | Road: South Powerhouse Road | Recommended Not Eligible | Yes-Paved Access Road APE | None, lodge is recommended as not eligible to NRHP/CRHR. |
| LLHEP-J F-10 | CA-TEH-2502H | Historic | Road: Manton School Road | Recommended Not Eligible | Yes-Paved Access Road APE | None, road is recommended as not eligible to NRHP/CRHR. |
### Table 1.7.1  Archaeological and Architectural Resources Identified within the Lassen Lodge Hydroelectric Project (continued)

<table>
<thead>
<tr>
<th>Temporary Resource #</th>
<th>Trinomial/Primary #</th>
<th>Resource Type</th>
<th>Description</th>
<th>NRHP/CRHR Eligibility Recommendations¹</th>
<th>Within APE</th>
<th>Current Project Impacts</th>
<th>Management Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLHEP-JF-11</td>
<td>CA-TEH-2503H</td>
<td>Historic</td>
<td>Road: Hazen Road</td>
<td>Recommended Not Eligible</td>
<td>Yes-Paved Access Road APE</td>
<td>None, road is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>LLHEP-JF-12</td>
<td>CA-TEH-2504H</td>
<td>Historic</td>
<td>Road: unnamed dirt road</td>
<td>Recommended Not Eligible</td>
<td>Yes-Dirt Access Road APE</td>
<td>None, road is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
<tr>
<td>LLHEP-JF-13</td>
<td>CA-TEH-2505H</td>
<td>Historic</td>
<td>Road: unnamed dirt road</td>
<td>Recommended Not Eligible</td>
<td>Yes-Dirt Access Road APE</td>
<td>None, road is recommended as not eligible to NRHP/CRHR.</td>
<td>No further management.</td>
</tr>
</tbody>
</table>

¹/ SHPO concurred with recommendations in a letter dated April 1, 2014.
1.7.4 Project Impacts and Proposed Mitigation

Significance of impacts on historically significant cultural resources under the NHPA is based on the criteria of adverse effect in Title 36 CFR Part 800, the regulations implementing Section 106 of the NHPA. Determination of effects are made by the lead federal agency (or designee), in consultation with the SHPO. Assessment of effects involving Native American or other traditional community, cultural, or religious practices or resources also requires consultation with the affected group.

Direct effects from Project construction activities could result from: vegetation clearing; grading, trenching for pipeline, excavation for pole placement; and any other earth-moving activity that disturbs historical resources or historic properties, previously undisturbed cultural resources, or cultural resources unevaluated for NRHP eligibility. Project operations are not expected to adversely affect historic properties within the APE. Direct effects from Project Maintenance could result from: vegetation clearing near project features, routine road maintenance, and/or ground disturbance from transmission line pole replacement.

The following adverse effects and/or impacts on cultural resources may occur as a result of the proposed Project construction, operation, and maintenance. Based on the analyses presented below, the project may have significant impacts on cultural resources, including potential historic properties and/or historic resources, as a result of Project activities. The presence or absence of human remains as well as Native American traditional resources at the time of this report is unknown. However, by implementing recommended mitigation measures outlined in Section 1.7.4.2, adverse effects and/or impacts to historic properties or historic resources may be avoided, reduced, or mitigated (also see Appendix I, Sections 5 and 6, and the Historic Properties Management Plan [HPMP] in Appendix J).

1.7.4.1 Construction and Operation Impacts

Archaeological Resources

Prehistoric sites CA-TEH-1358/H, CA-TEH-1490, CA-TEH-2495, and CA-TEH-2497 are within the APE and are considered potentially eligible to the NRHP under Criterion D and CRHR under Criterion 4. The SHPO concurred with these determinations in a letter dated April 1, 2014. Sites CA-TEH-1358/H and CA-TEH-1490 are bisected by existing dirt roads that will be used for Project access. These roads are currently in use by the public, PG&E, emergency fire vehicles, and/or logging trucks. These roads will be used primarily during the initial construction to access the transmission line. The roads that bisect CA-TEH-1358/H and CA-TEH-1490 will not be graded within the boundaries of the archaeological sites but capped with a layer of geofabric and 8 inches of class II aggregate to protect the resources (see Appendix J). This capping will be maintained during the entire construction period. Upon completion of
construction, access to the transmission line for operation and maintenance (O&M) relative to the aforementioned areas will be by alternate routes to completely avoid CA-TEH-1358/H and CA-TEH-1490 with vehicle traffic. O&M personnel for the transmission line will use access within the APE from the north and from the south, but will not cross through CA-TEH-1358/H and CA-TEH-1490. O&M crews will complete their work on foot within the defined APE, including the 40-foot-wide transmission line corridor or by helicopter, as required, to avoid these sites throughout the life of the license. A capping plan will be developed and approved in consultation with the SHPO, FERC, Tribes, and stakeholders and will be implemented prior to construction, and such approved capping plan(s) that have been agreed to by all parties will be considered “avoidance.”

If the sites cannot be avoided, they should be formally evaluated for eligibility to the NRHP and CRHR. If the sites cannot be avoided, a testing plan for these sites will be appended to the draft HPMP that has been submitted to the SHPO and with the FERC License Application.

Although CA-TEH-2495 and CA-TEH-2497 are recommended as eligible for listing to the NRHP under Criterion D and CRHR under Criterion 4, the SHPO concurred with these determinations in a letter dated April 1, 2014. Sites CA-TEH-2495 and CA-TEH-2497 will not be adversely affected by the Project and will be avoided because Project construction, maintenance, and operation activities do not include alteration, demolition, or destruction of the sites.

Site CA-TEH-2497 is bisected by an existing paved road that will be used for vehicle access to specific Project locations (e.g., penstock area). This road is currently in use by SPI logging trucks and heavy equipment (e.g., skidders) and will be used by Project vehicles as it is currently. CA-TEH-2497 will be avoided by Project ground-disturbing activities. The only activity that will occur within the site boundaries during construction, maintenance, and operation of the Project is driving over the paved access road that passes through the resource. Project activities do not include alteration, demolition, or destruction of the paved road. Therefore, CA-TEH-2497 will be avoided by Project activity. In addition, measures to protect the site will include protective orange hazard fencing on either side of the road during construction (vehicles will not be allowed to stop or park within or near the site boundary), and periodic monitoring (during Project activities in the area) by an Archaeological and Native American Monitor. Protocols for site protection will be outlined in the HPMP that has been submitted to the SHPO and with the FERC License Application. During and after the proposed Project, the road will be used for the purpose for which it was constructed and continues to be used. If alterations such as realignment or widening are planned during the License of the Project, CA-TEH-2497 will need to be evaluated for its significance with regard to the NRHP and the CRHR.

Site CA-TEH-2495 is within the transmission line corridor and will be avoided by Project engineering and ground-disturbing activities. During construction, protective orange hazard
fencing will be placed outside the boundary of the site and the area will be monitored by an Archaeological and Native American monitor. Protocols for site protection are noted below and will be outlined in the HPMP.

If alterations such as realignment or widening are planned during the License of the Project, CA-TEH-2497 will need to be evaluated for its significance with regard to the NRHP and the CRHR.

Historic sites CA-TEH-1835H, CA-TEH-2041H, CA-TEH-2113H, 2LLHEP-JF-01H, CA-TEH-2496H, and CA-TEH-2498H are within the APE and are recommended as not eligible to the NRHP or CRHR, and therefore no further management considerations are necessary. The SHPO concurred with these determinations in a letter dated April 1, 2014, and therefore no further management considerations are necessary.

**Traditional Cultural Properties**

No traditional cultural properties were identified by the NAHC during the resource inventory. However, there is potential for traditional resources to be identified during on-going Tribal and stakeholder consultation. Therefore, there is a potential for significant impacts on Native American resources as a result of construction of the proposed Project. With incorporation of the protection measures listed in Section 1.7.5 these significant impacts would be reduced to less than significant.

**Architectural Resources**

There are eight architectural resources (Buildings, Structures, and Objects, or BSOs) within the APE. These primarily include roads—P-52-002472 (Ponderosa Way) and CA-TEH-2499H, formerly part of SR 36 (now the SPI A-line road), CA-TEH-2501H (South Powerhouse Road), CA-TEH-2502H (Manton School House Road), CA-TEH-2503H (Hazen Road), CA-TEH-2504H (unnamed two-track dirt road), and CA-TEH-2505H (unnamed two-track dirt road)—and structures CA-TEH-2500H (Lassen Lodge).

Although P-52-002472 (Ponderosa Way) and CA-TEH-2499H, formerly a segment of SR 36, are recommended as eligible to the NRHP under Criterion A and CRHR under Criterion 1 (significant to local history), they will not be adversely affected by the Project. The only activity that will occur within the site boundaries during construction, maintenance, and operation of the Project is driving over the access road that passes through the resource. The proposed Project construction, maintenance, and operational activities will not significantly impact either of these road segments because Project activities do not include alteration, demolition, or destruction of these road segments. Because these roads are currently in use and because the proposed Project will not significantly impact the historic integrity of these road segments, impacts to these historic resources will be less than significant. See Appendix I, Section 1.2.10
for discussion of access road use. At all times during use of roads for construction, operation and maintenance of the Project, vehicles will operate within the existing roadbed. Project access roads are illustrated on maps in Appendix I, Appendix A, Figures A-2a-4 and A-2b-1-16. Protection measures are outlined in the HPMP (see Appendix J).

Newly recorded roads CA-TEH-2501H (South Powerhouse Road), CA-TEH-2502H (Manton School House Road), CA-TEH-2503H (Hazen Road), and unnamed unsurfaced dirt roads CA-TEH-2504H and CA-TEH-2505H are recommended as not eligible to the NRHP or CRHR. The SHPO concurred with these determinations in a letter dated April 1, 2014, and therefore no further management considerations are necessary.

In addition, CA-TEH-2500H (Lassen Lodge) is recommended as not eligible to the NRHP or CRHR. The SHPO concurred with these determinations in a letter dated April 1, 2014, and therefore no further management considerations are necessary.

Please see Appendix I, Sections 5 and 6, for NRHP/CRHR evaluation discussion, conclusions, and adverse effects, and SHPO letter in Appendix J.

1.7.4.2 Mitigation Measures

It is recommended that the following mitigation measures be implemented and adhered to prior to and during Project construction to reduce potential impacts to cultural resources (see Appendix I, Section 6.4; measures are also included in the HPMP in Appendix J).

- **Continue Native American Consultation**—The tribes and individuals identified by the NAHC were contacted to identify potentially sacred sites and/or resources that may be impacted by the Project as well as any other concerns regarding the project. Rugraw shall continue to consult with any responding tribes and individuals to determine areas to avoid and/or appropriate management measures (such as Native American monitoring periodically during construction).

- **Avoidance**—The Project should be designed to avoid all potentially eligible and eligible cultural resources identified within the APE. Avoidance areas should include a 50-foot buffer at a minimum.

- **Resource Evaluations**—If any potentially eligible cultural resource or resource within the APE cannot be avoided, it will be evaluated for NRHP and/or CRHR eligibility. If necessary to avoid adverse effects or significant impacts on the resource, additional treatments may be recommended for those resources recommended as or determined eligible.

- **Worker Education/Training**—Prior to construction of the Project, all non-cultural resources Project personnel will be briefed by a an archaeologist meeting the Secretary of
the Interior’s Professional Qualification Standards for Archaeology about the prehistoric and historic archaeological resources within the APE. In addition, the training will include a discussion on the importance of, and the legal basis for, the protection of archaeological resources. Personnel will be given a training brochure regarding identification of cultural resources and protocols for reporting finds. If applicable, all archaeological and any Native American monitors will be introduced to Project personnel and their roles explained. The HPMP that has been developed for the project outlines the necessary procedures for worker education.

- **Archaeological Monitoring**—Given the archaeological sensitivity of the APE, a qualified archaeological monitor meeting the Secretary of the Interior’s Professional Qualification Standards for Archaeology, will be present on-site during ground disturbing activities. A Cultural Resources Monitoring Plan (CRMP) that outlines protocols and procedures will be developed prior to construction of the Project. In general, monitoring, will take place in areas containing sensitive resources and along the penstock APE adjacent to South Battle Creek, near sites CA-TEH-595 and CA-TEH-2497. In addition, archaeological sites CA-TEH-1835, CA-TEH-1490, and CA-TEH-2495 (near or within access roads) will be monitored by checking at random intervals. As a result of consultation, Beverly Ogle has requested an Archaeological and Native American Monitor during project construction in sensitive areas. If any cultural resources are identified by the monitor(s) during ground disturbing activities, the resource will be treated as an unanticipated discovery and the protocols outlined in the CRMP will be followed.

- **Unanticipated and Inadvertent Discoveries of Archaeological Resources**—If the construction staff or others observe previously unidentified archaeological resources during construction, they will halt work within a 200-foot radius of the find(s), delineate the area of the find with flagging tape or rope (may also include dirt spoils from the find area), and immediately notify the Project Archaeologist. Construction will halt within the flagged or roped-off area. The Project Archaeologist will assess the resource as soon as possible and determine appropriate next steps in coordination with the Rugraw and SHPO (and Native American representatives, as necessary). Such finds will be formally recorded and evaluated. The resource will be protected from further disturbance or looting pending evaluation. The monitoring plan developed for the construction of the Project will outline the protocol and procedures for unanticipated and inadvertent discoveries of archaeological resources.

- **Unanticipated and Inadvertent Discoveries of Human Remains**—If human remains and/or cultural items defined by the Health and Safety Code, Section 7050.5, are inadvertently discovered during construction activities, all work in the vicinity of the
find will cease and the Tehama County Coroner will be contacted immediately. If the remains are found to be Native American as defined by Health and Safety Code, Section 7050.5, the coroner will contact the NAHC by telephone within 24 hours. The NAHC shall immediately notify the person it believes to be the MLD as stipulated by California PRC, Section 5097.98. The MLD(s), with the permission of the landowner and/or authorized representative, shall inspect the site of the discovered remains and recommend treatment regarding the remains and any associated grave goods. The MLD shall complete their inspection and make their recommendations within 48 hours of notification by the NAHC. The monitoring plan that will be developed for the construction of the Project will outline the protocol and procedures for unanticipated and inadvertent discoveries of human remains.

- **Development of Historic Properties Management Plan:** As required by FERC, an HPMP has been developed for the management of cultural resources during ongoing O&M activities of the Project (see nonconfidential volume included as Appendix J). The plan has been developed in consultation with the SHPO, NAHC, affected Tribes, and other stakeholders. The draft plan has been submitted concurrently to the SHPO and FERC with the License Application for approval. The draft will also be submitted to the NAHC, affected Tribes and other stakeholders. Once approved, the HPMP will be implemented via a Programmatic Agreement and will remain in place throughout the duration of the FERC License for the Project.

### 1.8 SOCIODEMOMICS

#### 1.8.1 Environmental Setting

The Project would be located in the northeast portion of Tehama County, California, starting about 3.5 miles west of the town of Mineral and 14 miles east of the town of Paynes Creek, and ending less than a mile from the town of Manton. Tehama County is primarily rural, with much of the land base in public ownership. Portions of the Trinity, Mendocino, and Lassen National Forests are all within the county lines. Government, manufacturing, and retail trade are primary industries in the county. A large area of public and private timberlands in the county, including in the immediate vicinity of the Project, support a variety of forest industry operations.

As of the 2010 Census, the population of Tehama County was 63,463, up 13.2 percent from the 2000 census count of 56,039. The three closest towns—Manton, Mineral and Paynes Creek—had populations of 347, 123, and 57, respectively. The closest cities to the Project are Red Bluff, California, located approximately 33 miles southwest of the Project, and Redding, California, located about 30 miles northwest of the Project. The City of Red Bluff had a 2010 population of 14,076, while the City of Redding (Shasta County) population was 89,861 (U.S. Census Bureau 2010).
According to the 2007-2011 American Community Survey 5-year estimates (U.S. Census Bureau 2012), median household income in Tehama County was $38,753, and the median family income was $46,805. Per capita income in the county was an estimated $20,689. An estimated 20.6 percent of the population in Tehama County had incomes below the federal poverty level, including 30.6 percent of people under the age of 18 and 7.8 percent of people over the age of 65. By comparison, the median household income in the State of California was $61,632; median family income $70,231; and per capita income $29,634. The poverty rate statewide was 14.4 percent, including 19.9 percent of people under the age of 18 and 9.1 percent of people over 65.

Compared to California as a whole, Tehama County’s industry mix reflects an above average share of employment in natural resources (mainly forestry, and some agriculture) (8.3 percent county vs. 2.2 percent state), retail (14.3 vs. 11 percent), educational services/health care/social assistance (21.9 vs. 20.5 percent), construction (7.9 vs. 6.6 percent), and public administration (6.6 vs. 4.7 percent). As of March 2013, Tehama County had an unemployment rate of 13.2 percent (not seasonally adjusted), down 2.6 percent from the prior year but substantially higher than the statewide seasonally adjusted unemployment rate of 9.4 percent (California EDD 2013; U.S. Bureau of Labor Statistics 2013).

1.8.2 Project Impacts and Proposed Mitigation

This section describes potential impacts to socioeconomic conditions resulting from construction and operation/maintenance of the Project.

1.8.2.1 Construction Impacts

The Project’s peak work force will be approximately 30 people during construction. The estimated monthly payroll during construction would average approximately $75,000, assuming union pay scales, an average construction work force of 25 persons, and a typical distribution of supervisory, skilled, and unskilled labor. This monthly average yields a total payroll of $900,000 to $1,350,000 over the 12- to 18-month construction period. Based on current Project design, estimated local and payroll taxes during the construction period would total approximately $130,000 to $200,000. Additional minor local economic benefits may occur from the purchase of local construction materials and from other purchases made locally by Project workers. This Project income activity is temporary and would have a net positive, but insignificant, effect on the Tehama County economy.

Due to the small expected work force, impacts on local health care, education, recreation, water supply, sanitary, police, and fire protection services, as well as on the local housing supply, would be minimal. The cities of Red Bluff and Redding are within commuting distance from the Project, and it is anticipated that a large portion of the skilled work force would commute from these areas. Alternatively, workers could choose to rent locally at the Lassen Lodge or in the
town of Mineral. There are also temporary housing options in the vicinity such as recreational
vehicle (RV) and trailer parks that could be used by construction personnel. No residences or
businesses would be displaced by Project construction. The local labor force within commuting
distance is expected to be adequate to meet Project needs.

State Route 36 could experience increased traffic from commuting workers and transportation
of equipment and supplies. Nearby service establishments such as restaurants, bars, and
markets may have a temporary small increase in business from Project personnel during the
construction period. Increased traffic, activity, noise, dust, and general disturbance would occur
in the construction areas of the Project diversion works, the penstock route, the powerhouse,
and along the transmission line ROW. All construction activities are planned to take place on
private property or Tehama County land, with none planned on state or federal lands.

1.8.2.2 Operation and Maintenance Impacts

Following completion of construction, an estimated three full-time jobs are expected to be
maintained for the operational life of the Project. In addition to minimal payroll taxes and other
local taxes (i.e., hotel taxes, gas taxes, and user fees), the Project would generate an estimated
$120,000 in property tax revenue for Tehama County (figure approximated based on current
Project design). This contribution would occur annually and would last for the full life of the
Project.

With only three potential operational workers, impacts on local health care, education,
recreation, water supply, sanitary, police, and fire protection services, as well as on the local
housing supply, would be negligible. No residences or businesses would be displaced by the
Project. The local labor force within commuting distance is expected to be adequate to meet
Project needs.

Overall, the Project would have minimal, and most often negligible, impacts on the
socioeconomic conditions in the vicinity of the Project as well as in Tehama County more
broadly. Therefore, no socioeconomic mitigation measures are proposed for the Project.

1.9 RECREATIONAL RESOURCES

1.9.1 Environmental Setting

Within the Project area, defined as a one-mile buffer of all Project facilities, there are no
developed recreation sites or specific recreational land use designations. A small portion of
Lassen National Forest close to the transmission line route does not appear to have specific
management prescription under the existing Lassen Forest Plan (Forest Service 1992). The
interspersed Bureau of Land Management (BLM) parcels in the Project area are not open to the
general public.
As most of the Project area is in private ownership, public recreation access is limited. All access roads to SPI lands are gated and locked to limit public access to their forest lands. No overnight camping or fires are allowed on SPI lands. Timberlands are patrolled by SPI and signage indicates trespassers are prosecuted. No public access to the Ponderosa Way crossing of SF Battle Creek exists, as Ponderosa Way is gated in two locations that prohibit public access of the creek area.

Battle Creek Campground is the closest recreation site to the Project area at approximately 1.5 miles upstream from the diversion structure. This 50-unit campground and picnic area is operated by Lassen National Forest. In recent seasons the campground has operated at below capacity, only reaching full or near-full capacity during major holiday weekends. Public lands fronting SF Battle Creek are limited to a few hundred feet at the campground and adjacent lands upstream are closed to public use.

1.9.2 Project Impacts and Proposed Mitigation

This section describes potential impacts to recreation resulting from construction and operation/maintenance of the Project.

1.9.2.1 Construction Impacts

As current recreation use in the Project area is restricted, no or minimal impacts to recreational use are expected. Temporary increases in traffic along California SR 36 could cause minor delays to travelers heading east towards Battle Creek Campground or further to the main portion of Lassen National Forest. However, this effect would be minor and would not impact the end recreational experience once users have passed through the area.

1.9.2.2 Operation and Maintenance Impacts

Water withdrawals for the Project would not be large enough to impact downstream boating activities that take place over 2.5 miles downstream from the Project diversion structure. Further, the Project will not be in operation from approximately July through September each year (depending on actual rainfall), the typical busy season for recreation activities.

The Project proponents organized a site visit in 1999 with representatives of local recreational organizations, FERC, SPI, and CDFW. During this site visit, all parties agreed the opportunities for whitewater rafting were marginal at best. Hazardous conditions, including insufficient water flow, and the lack of public access were the primary reasons for the lack of whitewater rafting opportunity. The Project proponents subsequently engaged a third party to conduct a feasibility study of whitewater rafting in the Project river reach. The “Whitewater Boating Resource Study,” by Mr. Rick Dimick, July 1999, concluded that the stream reach seldom has sufficient water for whitewater kayaking, and potentially only navigable by an expert kayaker.
capable of running “extreme whitewater” around log jams, boulder sieves, and braided channels. In response to a request from the SWRCB, the Project proponents submitted the whitewater boating study to American Whitewater and Shasta Paddlers on July 19, 2001 with a request for any questions or comments. No comments were received from either group.

Given the lack of Project impacts to recreational resources, no mitigation measures are proposed.

1.10 SCENIC AND AESTHETIC RESOURCES

1.10.1 Environmental Setting

The visual setting of the Project is characterized by the geologic features of SF Battle Creek. The drainage topography is a combination of steep canyon walls, and inner canyon volcanic deposits incised by SF Battle Creek. The project is adjacent and immediately downstream of Cold Creek Butte, a volcanic feature that provides a visual backdrop on the eastern end of the Project.

1.10.1.1 Landscape Descriptions

The overall Project area can be characterized by five distinct landscape types as follows:

South-Facing Slopes: These are typified by a varied vegetative mosaic composed of isolated groupings of montane forest habitats associated with side drainages entering SF Battle Creek from the north. Inclusions of chaparral, talus, and rock outcrop are also observable on these slopes. The slopes are generally light in color, with gray/green vegetation and red/brown geology and soils. The visual texture is predominantly rounded, low profile forms, punctuated by isolated conical forms of individual and clumps of trees. Views and vistas are generally unobstructed.

Coniferous North-Facing Slopes: These are characterized by relatively dense and homogenous vegetative cover. Timber management activities, including harvesting and road construction have increased the number of openings, thereby providing numerous inclusions that offer vegetative diversity. This slope also contains a utility corridor and SR 36 on the southern edge of the Project area. These slopes are predominantly green, with red/brown soils in areas associated with roads and timber management activities. The visual texture is uniform, at the stand level. Timber management activities provide variation in size and density throughout the Project area. Views and vistas may be limited, except in areas where timber management activities and established uses (roads, utilities) have resulted in large, continuous openings in the canopy.
**Mixed Woodland North-Facing Valley Slopes:** These slopes consist of dense cover of low growing chaparral species, punctuated by taller hardwood and conifer species. To a lesser extent, timber management activities have occurred in this type of landscape, particularly in the form of roads and skid trails constructed to access conifer stands. These slopes vary between blue and green, depending on the type and density of vegetation. Soils and rock outcrops are typically various shades of red and brown. The visual texture has a high degree of diversity in shape and form, with the interaction of vegetation of geologic features and vegetation. The views and vistas are highly variable, particularly in areas where timber management activities have occurred.

**Creek Floodplain:** This area is composed of relatively gentle slopes, a colluvial stream channel, localized alluvial deposits and riparian vegetation. This landscape has elements of riparian and upland vegetation, including chaparral, hardwoods, and conifers. It also has flowing water and localized aquatic vegetation that contributes to the character of the landscape. Anthropogenic activities, including long-term recreational use, the old abandoned Highway 36 corridor, and timber management activities, have contributed to the character of this landscape. Features such as bridges and abutments, paved roads, and historic campgrounds are superimposed on the natural features of the landscape. This landscape has a wide range of colors, ranging from the blue-green water features to the black remnants of the old highway. The visual texture is highly diverse, and includes the sinuous feature of the creek and the distinct lines of roads and bridges. The views and vistas are largely dependent on the level of anthropogenic activity occurring in a specific area.

**Creek Canyon and Gorge:** This landscape is characterized by cliff walls and outcrops of exposed basaltic lava flows, waterfalls and cascades, large boulders and intermittent vegetation (riparian and upland). The landscape is highly diverse in association with the topographic features of volcanic terrain. Although numerous roads and trails have been constructed on or adjacent to the rim of the gorge, little evidence of anthropogenic activity is observable below the rim. Colors within this landscape are a contrast of dark grey/brown rock, green vegetation, and the colors of water. The visual texture is dominated by the canyon walls, with inclusions of vegetation and channel features. The inner gorge with vertical walls in excess of 100 feet combined with the sinuous stream channel severely constrains views and vistas below the rim.

**1.10.1.2 Project Features**

All of the Project features except for portions of the transmission line are located on private lands and in steep canyon areas surrounded by dense vegetation and will not be visible to the public.
Power generated from the Project will be transmitted by a new approximately 12-mile-long 60-kV transmission line within a 40-foot-wide ROW easement to the point of interconnection (POI) on the PG&E 60-kV Volta-South transmission line in the town of Manton, California. The transmission line will begin at the substation and proceed in a westerly direction approximately ½ mile down the canyon. It will then turn north for approximately 1 mile then traverses west-northwest approximately 10.5 miles to the switchyard and POI on South Powerhouse Road.

The transmission line and appurtenant facilities will be located entirely on private lands with the exception of approximately 1.5 miles of transmission line within the Tehama County road ROW on Hazen and Manton School Roads. The transmission line will be located adjacent to the roadway in this location and will be visible to motorists and some local residences. The transmission line will be supported by single wood poles or wood H-frame structures which will vary in height from 40 to 60 feet above the surface of the ground.

1.10.1.3 Key Viewing Areas

Figure 1.10-1 shows the Project Layout with six photographic key viewing areas (KVAs) and gate locations that limit public access to Project facilities. A detailed description of the Project is provided in Exhibit A. Overall, the Project area is comprised of natural forested landscapes with few visible structures. Several small areas of developed land occur near the Project at distances ranging from 0.1 to 0.75 mile. Manton, a small town with a population of 347, is the only developed community adjacent to the Project area and is approximately 0.7 mile from the Project.

The typical viewer groups associated with the Project would be residential and recreational users and motorists. As there are no formal recreation access points or facilities proposed as part of the Project, the primary viewer groups would be residents and motorists. Residential viewers include rural residences and ranch or farm facilities, most of which are located on the western portion of the Project, south and southeast of Manton. Motorists are those users who have a view of a given project feature or area from a publically accessible roadway.
The transmission line on the western portion of the Project will be visible adjacent to the roadway for a distance of approximately 1.5 miles on Manton School and Hazen Roads, as shown between points A and B on Figure 1.10-1 as well as the crossing of South Powerhouse Road at point C. Points A, B and C show the locations of gates that limit public access to Project facilities. The new transmission line will be located on the north side of Hazen Road and the west side of Manton School Road. There currently is an existing wood pole line located on the east side of Manton School Road.

Other motorists viewing the transmission line may be drivers or passengers using SR 36. These users can be classified as commuters, local road users, or tourists. Tourists are generally more aware of overall appearance from the road, whereas local residents traveling the same routes frequently may be acclimated to the general view, but are more likely to be aware of visual changes. Regardless of the type of highway user, views are usually short duration, with less foreground emphasis.

Table 1.10-1 below provides a summary of the inventoried KVAs. Figures 1.10-2 through 1.10-7 (following the discussion below of each KVA) provide photographs of the KVAs taken during a field reconnaissance.

**Table 1.10-1  Summary of Inventoried Viewpoints**

<table>
<thead>
<tr>
<th>Viewpoint Number</th>
<th>Location</th>
<th>Distance to Project Site</th>
<th>Project Site Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>KVA-1</td>
<td>Mount Lassen Vista Point</td>
<td>2.1 miles</td>
<td>Low to None</td>
</tr>
<tr>
<td>KVA-2</td>
<td>Hazen Road</td>
<td>120 feet</td>
<td>High</td>
</tr>
<tr>
<td>KVA-3</td>
<td>Manton School Road</td>
<td>116 feet</td>
<td>High</td>
</tr>
<tr>
<td>KVA-4</td>
<td>Residence along Manton School Road</td>
<td>110 feet</td>
<td>Moderate</td>
</tr>
<tr>
<td>KVA-5</td>
<td>Residence #2 along Manton School Road</td>
<td>0.5 mile</td>
<td>Low</td>
</tr>
<tr>
<td>KVA-6</td>
<td>South Powerhouse Road</td>
<td>220 feet</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

**KVA-1: Mount Lassen Vista Point (Figure 1.10-2)**

KVA-1 occurs on SR 36 at a vista point of Mount Lassen, approximately 2.1 miles south of the Project transmission line. The undulating terrain of the foreground and middle ground allows for focal views of the background silhouettes such as Mount Lassen. Topographic relief across the setting consists of moderate to high relief composition varying from relatively undulating terrain to more dramatic distant terrain, adding to the panoramic visual appeal to form and line characteristics of the area. There are no natural water features visible from this viewing angle and distance. There are no visible manmade modifications other than the roadway. The area is characterized by little color variations (desert tan, gray, olive green), and has low contrast of
generally flat tones. Views from this KVA consist of natural desert scrub land juxtaposed against distant heavily forested landscapes.

This KVA was chosen because it represents a highly sensitive view and is a high concentration area for traveling/recreational viewers. The view duration at this location is considered moderate overall, as the viewers would likely stop and consider the viewpoint directly toward the Project. Again, Project features cannot be seen from this KVA due to the steep canyon location in which they are located and the dense surrounding vegetation.

**KVA-2: Hazen Road (Figure 1.10-3)**

KVA-2 occurs on Hazen Road approximately 600 feet east of the Rolling Hills Road intersection, and approximately 120 feet north of the Project transmission line. The relatively flat terrain, combined with moderately vegetated foreground does not allow for focal views of the background or any extended viewing distance. There are visible man-made modifications present in the landscape including roadway and fencing. The area is characterized by little color variations (desert tan, gray, forest green, olive green), and has low contrast of generally flat tones. Views from this KVA consist of a rural grassland landscape screened by foreground vegetation. The landscape is fairly common within the region and little to no scenic value. This KVA represents views available for local residents living along Hazen Road. As shown in Figure 1.10-3, viewers at this location have a partially screened view toward the Project transmission line. This was chosen as a representative viewpoint because it is relatively close to the proposed transmission line and is indicative of views for both local travelers and residential viewers. The view duration at this location is brief for travelers, but long for adjacent residents. The visibility of a project component (transmission line) from KVA-2 would be high due to the close distance of the view.

**KVA-3: Manton School Road (Figure 1.10-4)**

KVA-3 occurs on Manton School Road at the intersection of Hazen Road, approximately 116 feet southwest of the Project transmission line. The undulating terrain of the foreground and middle ground allows for panoramic, though partially screened views of the background silhouette terrain. Topographic relief across the setting consists of moderate relief composition varying from relatively undulating terrain to more dramatic distant terrain, adding to the panoramic visual appeal to form and line characteristics of the area. There are no natural water features visible from this viewing angle and distance. The area is characterized by color variations (desert tan, gray, various shades of green and olive), and has some contrast of generally flat tones. Views from this KVA consist of mostly interspersed heavily forested landscapes in the background and some grasses and underbrush in the middle ground where it appears that the trees were harvested. This landscape is mildly interesting within its setting, but fairly common within the region. The characteristics of the landscape seen from KVA-3 are
generally similar to those described previously for the other viewpoints. The undulating terrain and distant mountainous silhouettes are partially screened by vegetation. A variety of man-made modifications, including the roadway, signage, and fencing, are in the foreground and middleground views. The area is characterized by moderate color contrasts, with desert tan, gray, various shades of olive and green, and brown vegetation with dull or flat chromas in the foreground and middle ground. The visibility of a Project component (transmission line) from KVA-3 would be high due to the close distance of the view.

**KVA-4: Residence along Manton School Road (Figure 1.10-5)**

KVA-4 occurs on Manton School Road, approximately 110 feet north of the Project transmission line. The relatively flat terrain, combined with moderately vegetated foreground or middle ground does not allow for focal views of the background or any extended viewing distance. There are no natural water features visible from this viewing angle and distance. There are several visible manmade modifications present in the landscape including roadway, fencing, existing transmission line, and various structures and dwellings. The area is characterized by little color variations (desert tan, gray, forest green, olive green), and has low contrast of generally flat tones. Views from this KVA consist of rural land juxtaposed against screened foreground and middle ground forested landscapes. This landscape is fairly common within the region with little scenic value. The visibility of a Project component (transmission line) from KVA-4 would be moderate due to the close distance of the view as well as screening vegetation.

**KVA-5: Residence along Manton School Road (Figure 1.10-6)**

KVA-5 occurs on Manton School Road, approximately 0.5 mile north of the Project transmission line. The relatively flat terrain, combined with moderately vegetated foreground and middle ground does not allow for focal views of the background or any extended viewing distance. There are no natural water features visible from this viewing angle and distance. There are several visible manmade modifications present in the landscape including roadway, fencing, existing transmission line, and various structures and dwellings. The area is characterized by little color variations (desert tan, gray, forest green, olive green), and has low contrast of generally flat tones. Views from this KVA consist of rural land juxtaposed against distant heavily forested landscapes. This landscape appears modified and is fairly common within the region, with little scenic value. The visibility of a Project component (transmission line) from KVA-5 would be low due to the distance of the view.

**KVA-6: South Powerhouse Road (Figure 1.10-7)**

KVA-6 occurs on South Powerhouse Road, approximately 220 feet south of the Project transmission line which would cross the roadway in the immediate foreground. The substation is on the east side of the road and the utility pole is on the west side of the road. The undulating
terrain of the foreground and middleground is partially screened by trees, allowing focal views though there are some partial views of background silhouettes. Topographic relief across the setting consists of moderate relief composition varying from relatively undulating terrain to more dramatic distant terrain (which is partially screened), detracting from the visual appeal. There is also an area adjacent to the view that is being cultivated for hay and there are scattered houses and farm buildings. There are no natural water features visible from this viewing angle and distance. There are visible manmade modifications including the roadway, transmission line, fencing, residences, and farm structures adjacent to the view. The area is characterized by color variations (desert tan, gray, brown, various shades of green and olive), and has generally flat hues which are characteristic of the Cascade Ecoregion. Views from this KVA consist of mostly semi forested and agricultural landscapes as well as meadows. The landscape is mildly interesting but fairly common within the region. The visibility of a Project component (transmission line) from KVA-6 would be moderate due to the close distance of the view as well as screening vegetation.
Figure 1.10-3
Key Viewing Area 2
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496
Figure 1.10-4
Key Viewing Area 3
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496
Figure 1.10-5
Key Viewing Area 4
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12496
Figure 1.10-6
Key Viewing Area 5
LASSEN LODGE HYDROELECTRIC PROJECT
FERC Project No. 12490

KVA 5

Zoomed in area of Project
Figure 1.10-7
Key Viewing Area 6
Lassen Lodge Hydroelectric Project
FERC Project No. 12490
1.10.2 Project Impacts and Proposed Mitigation

1.10.2.1 Construction Impacts

Construction activities will be evident to the public, and construction equipment will be present along Manton School and Hazen Roads. Construction impacts will be of short duration and will likely occur in the span of a few months during the spring. Some portions of the transmission line will have the poles and conductors installed by helicopter, which will result in less visual impact due to less landscape disruption during the construction phase.

1.10.2.2 Operation Impacts

Access roads would be used by maintenance crews and vehicles for inspection and maintenance activities of Project facilities and the transmission line. Visual impacts would result from inspection and maintenance activities producing traffic and dust on access roads; however, these impacts would be temporary and minor.

The 60-kV powerline would be only a slight visual impact in the regional setting. Though some specific static viewpoints would have high visibility, the overall alignment would only impact approximately 1.5 miles of publicly accessible roadway views.

1.10.2.3 Proposed Mitigation

Project-wide visual mitigation measures have been incorporated into the Project design to help mitigate the visual contrast of the powerline in the landscape:

- All paint or discoloring agents applied to rocks or vegetation prior to or during construction activities that indicate limits of survey or construction activity shall be removed upon completion of construction activities.
- To reduce visual contrast in areas where overstory vegetation is removed for access, pole locations, or conductor clearance, specific sections of the clearing edges will be feathered (trees thinned/removed from the edge of the right-of-way out or away from the right-of-way boundary) to give a natural appearance, where not in conflict with regulatory requirements (e.g., North American Electric Reliability Corporation, Western Electricity Coordinating Council, and Occupational Safety and Health Administration requirements).
- Wood poles will be used to support the transmission line in order to blend with surrounding vegetation and reduce contrast.
- Helicopter construction in specific areas will allow for reduced impacts to the ground surface.
1.11 LAND USE

1.11.1 Environmental Setting

Land uses near the Project are predominantly forestry, rural development, and open space. For purposes of this analysis, the Project area is defined as the land within a 1-mile buffer of Project facilities (approximately 19,824 acres). Within the Project area, land cover is mostly forested or shrub/scrub vegetation, with some areas of grassland, developed open space, and low and medium intensity development (USGS 2011). Figure 1.11-1 depicts land cover in the Project area from the National Land Cover Database (USGS 2011). Table 1.6-1 in Section 1.6, Botanical and Wetland Resources, provides land cover by acres. Rugraw has recorded long-term and/or Grant Deed easements for Project facilities on approximately 0.4 percent (82 acres) of the Project area.

Principal landowners in the Project area are as follows:

- **SPI**: SPI bought, at the beginning of 1993, much of the lands of Diamond International Corporation, totaling approximately 233,000 acres within the region. This property is broken down into the northern and the southern tracts. The Project area lies roughly in the center of the northern tract, which comprises approximately 70,000 acres. Approximately 53 percent (10,508 acres) of the Project area is owned by SPI.

- **Richard Montarbo**: In 1997, Richard Montarbo purchased approximately 600 acres in Sections 23 and 14 from Rugraw. Rugraw formally used the southern portion of this land, nearest SR 36, for cabin rentals (Lassen Lodge). This area is zoned R1-B(86) which permits development of single-family residential units on lots no smaller than 86,000 square feet (approximately 2 acres). The remainder of the property (Section 23 and the southwest quarter of Section 14) is designated Public and Resources Lands (Tehama County 2009). About 3 percent (600 acres) of the Project area is owned by Richard Montarbo.

- **BLM**: The BLM has jurisdiction and manages a portion of lands, approximately 181 acres, located in Sections 19 and 20 (R2E, TS28N) classified "Vacant Public Domain" lands. It is managed for multiple uses. This land is situated on the north side of SF Battle Creek, and because of the steep terrain and limited access, is used as open space. At the present time, the BLM has determined this parcel is available for disposal due primarily to its inaccessibility (BLM 2012). About 6 percent (1,248 acres) of the Project area is managed by BLM; however, no Project facilities cross BLM-managed lands.

The Forest Service also manages a small portion of the Project area, slightly more than 1 percent (266 acres), which is part of Lassen National Forest. Most of the National Forest property is located at the eastern end of the Project area at a distance of about ½ to ¾ mile from the closest Project facilities. One small National Forest parcel (37 acres) is located within 25 feet to the north of the proposed transmission line where the route crosses Ponderosa Way. This parcel does not
appear to have any specific management prescription under the existing Lassen Forest Plan (Forest Service 1993), and an existing road, Ponderosa Way, crosses the property. The majority of the Forest Service lands in the area are managed for multiple uses under a General Forest Zone designation. These include timber harvesting, fish and wildlife habitat, watershed protection, and recreational activities such as camping, hiking, and fishing.

Figure 1.11-2 shows general land ownership/jurisdictional areas for the Project area.

Tehama County General Plan
The Project area is entirely within Tehama County, California. Land use in the county is guided by the Tehama County General Plan 2008-2028, adopted on March 31, 2009. Within the Project area, land use is mostly designated as Timber, with smaller areas of Resource Lands, Upland Agriculture, and Public.
### Project Area Land Cover

#### Figure 1.11-1

<table>
<thead>
<tr>
<th>Project Features</th>
<th>Cover Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipeline/Pipeline</td>
<td>Open Water</td>
</tr>
<tr>
<td>Transmission Line</td>
<td>Grassland/Herbaceous</td>
</tr>
<tr>
<td>Station Service Line/Utility Tap</td>
<td>Developed - Low Intensity</td>
</tr>
<tr>
<td>Project 1-mile Buffer</td>
<td>Developed - Medium Intensity</td>
</tr>
<tr>
<td></td>
<td>Mixed Forest</td>
</tr>
<tr>
<td></td>
<td>Shrub/Scrub</td>
</tr>
<tr>
<td></td>
<td>Emergent Herbaceous Wetlands</td>
</tr>
</tbody>
</table>
Figure 1.11.2 Project Area Land Ownership

Project Features
- Forest/Powerline
- Transmission Line
- Station Service Line/Rusty Tap
- Project 1-mile Buffer

Land Ownership
- GIS lands
- Bureau of Land Management
- State
- US Forest Service
- Other Private Lands

Lassen Lodge Hydroelectric Project

E-123
1.11.2 Project Impacts and Proposed Mitigation

The Project will be located on lands owned or managed by SPI, Tehama County, or other private landowners. Rugraw has long-term or Grant Deed easements on the property where Project facilities will be located, shown by landowner (east to west) in Table 1.11-1 for a total of 92.28 acres impacted. The Project is not expected to affect land uses upstream of the diversion point along SF Battle Creek or downstream from the powerhouse area. The penstock would be buried and would not affect current or potential future uses.

<table>
<thead>
<tr>
<th>Owner</th>
<th>Distance (ft.)</th>
<th>Easement Width (ft.)</th>
<th>Project Element(s)1/</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sierra Pacific</td>
<td>61,000</td>
<td>45</td>
<td>1,2,3,4,6</td>
<td>63.00</td>
</tr>
<tr>
<td>Richard Montarbo</td>
<td>4,000</td>
<td>45</td>
<td>4</td>
<td>4.13</td>
</tr>
<tr>
<td>Mark Winning</td>
<td>170</td>
<td>45</td>
<td>4</td>
<td>0.18</td>
</tr>
<tr>
<td>PG&amp;E</td>
<td>5,280</td>
<td>45</td>
<td>4</td>
<td>5.45</td>
</tr>
<tr>
<td>Lee et al.</td>
<td>9,000</td>
<td>45</td>
<td>4</td>
<td>9.30</td>
</tr>
<tr>
<td>George Hrycenko</td>
<td>4,500</td>
<td>45</td>
<td>4</td>
<td>4.65</td>
</tr>
<tr>
<td>Tehama County</td>
<td>7,400</td>
<td>20</td>
<td>4</td>
<td>3.40</td>
</tr>
<tr>
<td>Patricia Grag</td>
<td>2,100</td>
<td>45</td>
<td>4,5</td>
<td>2.17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>92.28</strong></td>
<td></td>
</tr>
</tbody>
</table>

1/ Project Elements: 1 - Diversion, 2 - Penstock, 3 - Powerhouse/Substation, 4 - 60-kV Transmission Line, 5 - Switchyard, 6 - 12-kV Station Service Line.

The proposed new 60-kV transmission line will come within 300 feet of several rural homes and other buildings at the western end of the Project. However, in these locations the line generally parallels the existing roadways and it should not pose a significant change to the rural land use setting.

The transmission line route would not represent a significant conflict with the Timber, Resource Lands, and Upland Agriculture designations (Tehama County 2009), however, a County Land Use Permit is still required. Rugraw is in discussion with the County and is updating the land use permit application to meet all current information requests. Final permit review and approval is anticipated to take place in 2014.

1.11.2.1 Proposed Mitigation

To avoid and minimize impacts to land use, the Project would implement the following measures:

- Delineate roads and work areas prior to the start of construction, and restrict Project activities to those designated areas;
Utilize existing roads to the maximum possible extent, constructing new access roads only when no feasible alternative exists;

Limit access roads to a one-lane width of 12 feet whenever possible;

Restore vegetation directly removed or disturbed during Project construction as appropriate in accordance with California forestry regulations and best practices;

Reforest temporary access roads per landowner recommendations when they are no longer required; and

Consult with neighboring landowners prior to construction and maintain an ongoing public contact to address any questions and concerns.

1.12 THREATENED, ENDANGERED, AND SENSITIVE SPECIES AND CRITICAL HABITATS

This section identifies TES species and designated critical habitats potentially present or known to occur within the Project area, discusses potential impacts as a result of construction and operation of the Project, and presents proposed mitigation measures that will minimize potential adverse impacts on TES species and critical habitats. This section analyzes potential impacts on TES species and critical habitats. Non-TES species are discussed in Sections 1.4 – Fisheries, 1.5 – Wildlife and Habitat, and 1.6 – Botanical and Wetland Resources.

TES species are those species that are listed as threatened or endangered by the USFWS under the ESA (USFWS 2013b, 2013c) or the CDFW under the CESA (CDFW 2013a), are proposed or candidates for listing under the ESA or CESA, or are listed as sensitive by fish and wildlife management agencies.

Sensitive species include: species listed as fully protected by CDFW (CDFW 2013b); California species of special concern (CDFW 2011); species on the California watch list (CDFW 2011); and birds of conservation concern (USFWS 2008).

This section also addresses special-status plant species, which include plant species state-listed as rare under the California Native Plant Protection Act (California Fish and Game Code Section 1900 et seq.) and plants considered by the California Native Plant Society (CNPS) to be “rare, threatened, or endangered in California” (CNPS Ranks 1B and 2) (CDFW 2013d).

Critical habitats include designated critical habitat (USFWS 2013d).
1.12.1 Environmental Setting

1.12.1.1 Fisheries

At present, access to the Project area by ESA designated anadromous salmonids is blocked by downstream dams. The fisheries of the Battle Creek watershed have been affected by the operations of small hydropower dams since the early 1900s. These dams are currently owned by PG&E. The Battle Creek Hydropower system has blocked access to salmon and steelhead in both forks of Battle Creek. The South Diversion Dam (RM 14.35) on SF Battle Creek is the uppermost man-made blockage on the SF Battle Creek. The Project area is above the current range of anadromy. At this point, no anadromous fish species are expected to be present above the South Diversion Dam until this passage barrier is removed. The South Diversion Dam is expected to be removed or modified as part of the BCSSRP. According to the Bureau of Reclamation, all barriers are expected to be removed, and full upstream migration is expected to be restored past these barriers by 2016.

However, ESA designated critical habitat for two threatened species—the Central Valley Distinct Population Segment (DPS) steelhead and Central Valley Evolutionarily Significant Unit (ESU), spring-run Chinook salmon—extends into the proposed Project area (Table 1.12-1). This ESA designation was made in 2005 after downstream passage of anadromy was blocked, and lacks historical evidence of the extent of Chinook and steelhead presence in the Project reach. The Project bypass reach overlaps about 0.8 mile of critical habitat designated for ESA-listed spring-run Chinook salmon extending up to RM 21.4. Critical habitat for ESA-listed steelhead extends 22.3 miles up SF Battle Creek to Angel Falls, and thus overlaps 1.7 miles of the proposed bypass reach (the reach within the natural channel in which flow would be reduced by the amount diverted for hydro generation). The effects of the Project on steelhead and spring-run Chinook critical habitat have been assessed below and in detail in the Biological Assessment, included here as Appendix D.

Table 1.12-1. ESA Fish Species and Critical Habitat Status within the Project Area

<table>
<thead>
<tr>
<th>Common Name (Scientific Name)</th>
<th>Status/Date of ESA Listing</th>
<th>Presence in the Project Area</th>
<th>Critical Habitat Present in the Project Area</th>
<th>Date of Critical Habitat Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinook salmon <em>(Oncorhynchus tshawytscha)</em>; Central Valley ESU; Spring-run</td>
<td>Threatened September 16, 1999 (64 FR 50394)</td>
<td>NO</td>
<td>YES</td>
<td>September 2, 2005 (70 FR 52488)</td>
</tr>
<tr>
<td>Steelhead <em>(Oncorhynchus mykiss)</em>; Central Valley DPS</td>
<td>Threatened May 18, 1998 (63 FR 13347)</td>
<td>NO</td>
<td>YES</td>
<td>September 2, 2005 (70 FR 52488)</td>
</tr>
</tbody>
</table>
Analyses of habitat conditions in the upper SF Battle Creek indicate that natural production of spring-run Chinook salmon is unlikely to be sustainable in the Project reach. The velocities, depths, or areas of gravel patches are poorly suited for spawning of spring-run Chinook salmon at the prevalent flows in September when spawning peaks. Gravel patches located within pools are most likely to provide appropriate depths, velocities, and substrate that determine high quality spawning habitat. However, average velocities over these gravel patches at pool tailouts were all under 0.1 m/s when measured at a flow of 13 cfs (Sellheim and Cramer 2013). This is far below the velocity of 0.3 to 0.7 m/s where Chinook salmon spawn (Keeley and Slaney 1996).

Greater flows could provide the velocities that Chinook salmon prefer, but spring-run Chinook salmon spawn from late August through September when the natural stream flows are low. Median flow for the SF Battle Creek in September is only 9 cfs and often drops to 3 cfs. The proposed Project would not operate at that time and would have no effect on natural flows. Modeling of habitat changes in response to a range of flows, beginning with measurements of depth and area of each available gravel patch, indicates that only one gravel patch met minimum criteria for area (20.7 square meters) and depth (≥ 1 foot) of Chinook salmon spawning at median flows in September (9 cfs), and it would support only one Chinook salmon redd. Habitat to support only one spawning pair cannot sustain a population. The flow statistics for 10 years of record show the minimums of monthly mean flows have been below 8 cfs in seven months of the year (July through January), and are under 4 cfs during the other five months (August through October). This means that, in many years, there would be several months duration when the areas and depths of channel units in the Project reach would be less than 10 cfs. Flows have dropped to 3 cfs in 2013 and in 2001 during the spawning season for spring-run Chinook salmon, and it is probable that sequences of dry years with 9 cfs or less in September would occur with dry climate cycles in the future. Sequences of 5 consecutive years (the span of a life cycle) with flows 9 cfs or less should be expected to eliminate any natal population homing to the Project reach.

If spring-run Chinook salmon are able to pass the numerous passage obstacles downstream and reach the Project area, they would face high risk of pre-spawning mortality while holding in the low warm water through summer. High temperatures (greater than 72°F [22°C]) found in the Project reach during low-flow years would often lead to high levels of pre-spawning mortality.

On the other hand, 1.7 miles below the Project area, the inflow from several springs in the vicinity of Panther Grade creates substantially better conditions of flow and temperature to reliably support spring Chinook salmon below Panther Grade. The sharp increase in flow found from 3 cfs above Panther Grade to 18 cfs immediately below Panther Grade, accompanied by the cooling effect of spring water inflows at 49°F (9.5°C), offers much better opportunities for over summer survival and September spawning by spring-run Chinook salmon.
Steelhead would be a more likely anadromous species to be present in the reach above Panther Grade, based on their ability to pass through difficult migratory barriers. The smaller gravel patch sizes that are present in that reach would be more suitable for steelhead than the larger-bodied Chinook salmon. There are two barriers upstream of Panther Grade that are believed to be largely impassable. They may be passable during uncommonly high flows; however, whether steelhead would perform upstream migration during such high-flow events is in question. It was agreed that the first barrier (identified in 1984) was impassable by CDFW biologists (Hoopaugh or Healy). The most recent declaration (in 2002) that this barrier may be passable during extreme flow events was based on visual observations by agency personnel; however, no quantification was performed to support this conclusion.

The timing of both the upstream migration and spawning for steelhead dramatically reduces their exposure to any high stream temperatures as compared to spring-run Chinook salmon, and allows them to take advantage of higher flows. Further, because steelhead are smaller, they are able to utilize smaller patches of gravel, shallower depths, and slower velocities for spawning. Thus, the prospects of steelhead to encounter favorable conditions for migration and spawning are substantially greater than those for spring-run Chinook salmon. However, they still would face a strong limitation to rearing from low summer flows, and they would have to share the available habitat with the vibrant rainbow trout population that inhabits the reach.

Both resident and anadromous steelhead are present in the lower reaches of Battle Creek, and resident steelhead could possibly be present in the Project reach should anadromous individuals gain access to the reach. Anadromous steelhead would therefore have to share the limited habitat available with resident rainbow trout, creating a further limitation to their sustained success in the Project area.

1.12.1.2 Wildlife

TES wildlife species habitat assessments were conducted to identify TES wildlife species potentially occurring in the Project area based on available habitat (see California Red-legged Frog Site Assessment [Appendix E] and Threatened, Endangered, and Sensitive Wildlife Species Habitat Assessment [Appendix H]). Habitat assessments included desktop research, literature review, and field habitat assessments of the Project area, which included a 1-mile buffer around the Project.

The Project is not located within designated critical habitat for listed terrestrial and aquatic wildlife species; the closest designated critical habitat is vernal pool tadpole shrimp (Lepidurus packardi) critical habitat located approximately 6.5 miles west of the west end of the Project (USFWS 2013d).
Table 1.12-2 lists TES wildlife species known to occur or potentially occurring within the Project area. Habitat requirements were identified based on species accounts and field guides (CDFW 2013a; CaliforniaHerps 2013; CalPIF 2013; Jameson and Peeters 2004; Sibley 2000; Stebbins 2003; USFWS 2007). Species status was determined through a review of species profiles (USFWS 2013b), Birds of Conservation Concern (USFWS 2008), and CDFW species lists (CDFW 2011, 2013b, 2013c).
<table>
<thead>
<tr>
<th>Table 1.12-2</th>
<th>TES Wildlife Species Potentially Occurring Within the Project Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Listed Species</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Invertebrates</strong></td>
<td></td>
</tr>
<tr>
<td>Valley elderberry longhorn beetle (<em>Desmocerus californicus dimorphus</em>)</td>
<td>FT (Proposed for Delisting Oct. 2, 2012)</td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
</tr>
<tr>
<td>California red-legged frog (<em>Rana draytonii</em>)</td>
<td>FT, SSC</td>
</tr>
<tr>
<td>Species (scientific name)</td>
<td>Status1/</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
</tr>
<tr>
<td>Bald eagle (Haliaeetus leucocephalus)</td>
<td>FD, CAE, CAFP, BCC</td>
</tr>
<tr>
<td>Northern spotted owl (Strix occidentalis caurina)</td>
<td>FT, SSC</td>
</tr>
</tbody>
</table>
### Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)

<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status1/</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western yellow-billed cuckoo (Coccyzus americanus occidentalis)</td>
<td>FPT, CAE, SSC, BCC</td>
<td>Dense, wide, deciduous riparian forest with large areas of contiguous closed canopy and well-developed understories. Willows and cottonwoods are preferred. Low elevation streams and rivers with unrestricted floodplains.</td>
<td>Species was not observed during field surveys and is not expected in the Project area due to elevation and a lack of well-developed riparian habitat.</td>
</tr>
<tr>
<td>Willow flycatcher (Empidonax traillii)</td>
<td>CAE, BCC</td>
<td>Inhabits extensive thickets of low, dense willows on edge of wet meadows, ponds, or backwaters. Requires dense willow thickets for nesting and roosting. Low, exposed branches are used for singing posts and hunting perches.</td>
<td>Species was not observed during field surveys and is not expected in the Project area due to a lack of suitable habitat. Riparian community is not well developed and lacks extensive willow thickets. Nearest mapped occurrence located approximately 3.7 miles east.</td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California wolverine (Gulo gulo)</td>
<td>FPT, CAT, CAFP</td>
<td>Use of mixed conifer, red fir, and lodgepole habitats has been documented, and wolverines probably use subalpine conifer, alpine dwarf-shrub, wet meadow, and montane riparian habitats. Use caves, hollows in cliffs, logs, rock outcrops, and burrows for cover, generally in denser forest stages. Den in caves, cliffs, hollow logs, cavities in the ground, under rocks; may dig dens in snow, or use old beaver lodges. Hunt in more open areas, using dense cover for resting and reproduction.</td>
<td>No wolverines were observed during field surveys. Species not expected in the Project area due to elevation. Nearest mapped occurrence located 3.8 miles north of the Project transmission line ROW.</td>
</tr>
<tr>
<td>Species (scientific name)</td>
<td>Status</td>
<td>Habitat Requirements</td>
<td>Potential to Occur</td>
</tr>
<tr>
<td>----------------------------</td>
<td>--------</td>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Sierra Nevada red fox <em>(Vulpes vulpes necator)</em></td>
<td>CAT</td>
<td>High elevation barren, conifer, and shrub habitats; montane meadows; subalpine woodlands and fell-fields. Summer habitat negatively associated with shrub and herbaceous cover. Winter habitat positively associated with forest cover comprised of large trees (&gt;60 cm DBH) with &gt;40% canopy closure. Den sites described as natural cavities in talus slopes or rockslides. May use earthen dens, boulder piles, or even the space beneath vacant cabins.</td>
<td>Species was not observed during field surveys and is not expected to occur within the Project area due to elevation and lack of suitable habitat. Dense shrub thickets and a lack of large trees with more than 40% canopy closure characterize most of the higher elevation portions of the Project, but potential denning habitat may exist in talus slopes and rockslides on south-facing slopes in the Project vicinity above the Project reach. Potentially suitable habitat was not identified within the area to be subject to ground disturbance. Nearest mapped location is approximately 3.2 miles east.</td>
</tr>
</tbody>
</table>

**Candidate Species**

**Mammals**

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>American pika <em>(Ochotona princeps)</em></td>
<td>CACT</td>
<td>Mid-montane to high alpine talus slopes, occasionally on mine tailings. At lower elevations, found in rocky areas within forests or near lakes. Prefers talus-meadow interface.</td>
<td>Species was not observed during field surveys and is not expected within the disturbance area, but may occur in the Project vicinity on south-facing talus slopes across from the Project. Nearest mapped occurrence is approximately 1.5 miles east.</td>
</tr>
</tbody>
</table>

<p>| Fisher <em>(Martes pennanti)</em> | FC, SSC | Mid- to late-seral stage forest habitat with a predominantly closed canopy and diversity of tree sizes and shapes, light gaps and associated understory vegetation, snags, fallen trees and limbs, and limbs close to the ground. Denning and resting habitat includes tree cavities located at least 30 feet above the ground. Requires large areas of mature, dense forest. | Species was not observed during field surveys and is not expected in the Project area due to insufficient contiguous preferred habitat and lack of evidence for fisher presence between the Pit River in the northern Sierra/Cascades and the Merced River in the southern Sierra per February 2010 status report (CDFW 2010). Nearest mapped occurrence is approximately 11.5 miles northeast near Lassen Peak (historic). |</p>
<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status1/</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitive Species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphibians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cascades frog (<em>Rana cascadae</em>)</td>
<td>SSC</td>
<td>Inhabits wet mountain areas in open coniferous forests to near timberline, including small streams, small pools in meadows, lakes, bogs, ponds, and marshy areas near streams. Typically found in water with no predatory fish. Standing water required for reproduction, hibernates in mud on the bottom of lakes and ponds during the winter. Lays eggs in shallow stream pools, lake margins, and clear mountain ponds with silty, sandy, or gravelly substrates.</td>
<td>Species was not observed during surveys. Potential habitat exists along the entire Project reach, with potential breeding habitat present in stream pools. Nearest mapped occurrence is approximately 3 miles upstream (historic). Populations near Mount Lassen identified in the 1920’s may now be extinct (CaliforniaHerps 2013).</td>
</tr>
<tr>
<td>Foothill yellow-legged frog (<em>Rana boylii</em>)</td>
<td>SSC</td>
<td>Frequents rocky streams and rivers with rocky substrate and open, sunny banks, in forests, chaparral, and woodlands. Sometimes found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools. Needs at least some cobble-sized substrate for egg-laying, and at least 15 weeks to attain metamorphosis. Eggs are attached to gravel or rocks in moving water near stream margins.</td>
<td>Species is known to occur within the Project area per probable observation at the Old Highway 36 Bridge and mapped occurrences downstream in the South Fork of Battle Creek and Soap Creek.</td>
</tr>
</tbody>
</table>
### Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reptiles</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western pond turtle <em>(Actinemys marmorata)</em></td>
<td>SSC</td>
<td>Found in ponds, lakes, rivers, streams, creeks, marshes, and irrigation ditches, with abundant vegetation, and either rocky or muddy bottoms, in woodland, forest, and grassland. Needs permanent water source. In streams, prefers pools to shallower areas. Logs, rocks, cattail mats, and exposed banks are required for basking. Needs sandy banks or grassy open fields up to 0.5 km from water for egg-laying.</td>
<td>Species was not observed during surveys. Due to rapid flow and steep banks that characterize the majority of the Project reach, species is not expected to occur in the Project area. Available nesting habitat is marginal due to a lack of grassy areas and rocky soils. Nearest mapped occurrence is approximately 3 miles southwest of the western end of the Project transmission line ROW.</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American peregrine falcon <em>(Falco peregrinus anatum)</em></td>
<td>FD, CAD, CAFP, BCC</td>
<td>Mountain ranges, river valleys, and coasts, near wetlands, lakes, rivers, or other water. Nests on cliff banks, dunes, mounds, rock and skyscraper ledges, tall towers, bridges, and rarely in tree cavities or old stick nests.</td>
<td>Species was not observed during surveys; however, species has been observed by Sierra Pacific Industries within the Project area in suitable habitat. Suitable nesting habitat occurs in several areas along the south-facing slope ranging approximately 80 to 960 feet above the creek and consisting of a series of 20- to 100-foot-tall cliffs. Nearest mapped location is 5.25 miles to the south, east of Paynes Creek.</td>
</tr>
<tr>
<td>Calliope hummingbird <em>(Stellula calliope)</em></td>
<td>BCC</td>
<td>Breeds in wooded habitats from ponderosa pine and montane hardwood-conifer up through lodgepole pine, favoring montane riparian, aspen, and other open forests near streams. Commonly feeds in montane chaparral and wet meadow habitats. Nests in woodlands or forests, often in a pine or montane riparian tree.</td>
<td>Species was not observed during surveys. Potential nesting habitat occurs in open forest near stream.</td>
</tr>
<tr>
<td>Species</td>
<td>Status</td>
<td>Habitat Requirements</td>
<td>Potential to Occur</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cassin's finch <em>(Carpodacus cassini)</em></td>
<td>BCC</td>
<td>Tall, open coniferous forests in lodgepole pine, red fir, and subalpine conifer habitats. Most numerous near wet meadows and grassy openings. Prefers tall trees in open, montane coniferous forests for nesting and resting, and nearby grassy meadows or other openings for foraging.</td>
<td>Species was not observed during surveys. Potential habitat exists within open coniferous forest with tall trees, although grassy meadows were not observed within the Project area.</td>
</tr>
<tr>
<td>Flammulated owl <em>(Otus flammeolus)</em></td>
<td>BCC</td>
<td>Coniferous habitats from ponderosa pine to red fir forests. Prefers low to intermediate canopy closure. Nests in cavities or woodpecker holes in aspen, oak, or pine snags or trees. Roosts close to trunk of fir or pine tree; also uses cavities in snags or trees for cover. Favors small openings, and edges and clearings with snags for nesting and roosting.</td>
<td>Species is not expected to occur in the Project area due to elevation.</td>
</tr>
<tr>
<td>Golden eagle <em>(Aquila chrysaetos)</em></td>
<td>CAFP, BCC</td>
<td>Golden eagles inhabit a variety of habitats including forests, canyons, shrub lands, grasslands, and oak woodlands. Nests are constructed on platforms on steep cliffs or in large trees. The main prey species for the golden eagle are rabbits, hares and rodents; but eagles will also takes other mammals, birds, and reptiles. Carrion (e.g., carcasses found on the landscape) is also a part of the eagle diet, especially during winter months. Needs open terrain for hunting; grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats.</td>
<td>Species was not observed during surveys. Potential nesting habitat may occur on south-facing cliffs across from the Project's eastern end, and foraging habitat may be provided by annual grasslands along the western end of the transmission line ROW.</td>
</tr>
<tr>
<td>Species (scientific name)</td>
<td>Status</td>
<td>Habitat Requirements</td>
<td>Potential to Occur</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lewis's Woodpecker <em>(Melanerpes lewis)</em></td>
<td>BCC</td>
<td>An uncommon, local winter resident occurring in open oak savannahs, broken deciduous, and coniferous habitats. Requires open habitats with scattered trees and snags with cavities. Usually nests in snags or dead parts of live trees, including sycamore, cottonwood, oak, or conifer. Suitable habitat includes open, deciduous and conifer habitats with brushy understory, and scattered snags and live trees for nesting and perching. Uses logged and burned areas. Prefers oaks and acorns in winter.</td>
<td>Species was not observed during surveys. Potential wintering habitat occurs within the Project area in oak woodlands, open Sierran mixed conifer habitat that includes snags, and the logged and burned areas. Project area is outside of summer range, but located within winter range.</td>
</tr>
<tr>
<td>Northern goshawk <em>(Accipiter gentilis)</em></td>
<td>SSC</td>
<td>Subalpine and upper montane mature and old growth coniferous or coniferous-hardwood forest with relatively dense canopy closure and open understories. Large areas of contiguous habitat increase the probability of occupancy. Usually nests on north slopes, near water. Red fir, lodgepole pine, Jeffrey pine, and aspens are typical nest trees.</td>
<td>Species was not observed during surveys, but is known to occur within the Project vicinity (near Panther Creek) per Sierra Pacific Industries data.</td>
</tr>
<tr>
<td>Oak titmouse <em>(Baeolophus inornatus)</em></td>
<td>BCC</td>
<td>Requires an elevated niche, where it forages foliage, twigs, branches, and trunks. It is occasionally seen foraging on the ground. Oak Titmice forage on blue oak <em>(Quercus douglasii)</em>, live oak <em>(Q. wislizenii)</em> and gray pine <em>(Pinus sabiana)</em>. Oak titmice prefer a woodland habitat in which oaks predominate, such as woodlands, oak savannah, open broad-leaved evergreen forests, and riparian woodlands. The open broad-leaved evergreen forest must be spacious, have oaks, and be on south-facing slopes. This species is associated with oak and pine-oak woodland, arborescent chaparral, and oak-riparian habitats.</td>
<td>Species was observed in a blue oak within montane chaparral habitat west of Soap Creek during surveys. Suitable habitat occurs on south-facing slopes in blue oak woodland and blue oak-foothill pine-interior live oak habitats within the Project area.</td>
</tr>
</tbody>
</table>

Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)
### Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)

<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status(^1)</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olive-sided flycatcher (<em>Contopus cooperi</em>)</td>
<td>SSC, BCC</td>
<td>Preferred nesting habitats include mixed conifer, montane hardwood-conifer, Douglas-fir, redwood, red fir, and lodgepole pine. Most numerous in montane conifer forests where tall trees overlook canyons, meadows, lakes, or other open terrain. Requires large, tall trees, usually conifers, for nesting and roosting sites; and lofty perches, typically the dead tips or uppermost branches of the tallest trees in the vicinity, for singing posts and hunting perches.</td>
<td>Species was observed in a snag located in Sierran mixed conifer habitat atop cliffs above Panther Creek during surveys. Habitat is present where tall trees overlook open terrain.</td>
</tr>
<tr>
<td>Osprey (<em>Pandion haliaetus</em>)</td>
<td>WL</td>
<td>Large, fish-bearing waters, primarily in ponderosa pine through mixed conifer habitats. Uses large streams, rivers, lakes, reservoirs, bays, estuaries, and surf zones. Uses large trees, snags, dead-topped trees, cliffs, or man-made structures in open forest habitats for cover and nesting, typically within 15 miles of a good fish-producing body of water.</td>
<td>Species was observed flying over the west end of the Project area near Manton, California. Species may nest in large trees, snags, and cliffs within the Project area due to the presence of large, fish-bearing waters within 15 miles. Nearest mapped occurrence is approximately 3.5 miles north of the Project transmission line ROW.</td>
</tr>
<tr>
<td>Prairie falcon (<em>Falco mexicanus</em>)</td>
<td>WL, BCC</td>
<td>Distributed from annual grasslands to alpine meadows, but associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Inhabits dry, open terrain, either level or hilly. Usually nests in a scrape on a sheltered ledge of a cliff overlooking a large, open area. Sometimes nests on old raven or eagle stick nests on cliffs, bluffs, or rock outcrops.</td>
<td>Species was not observed during surveys. Potential nesting habitat may occur on south-facing cliffs in the Project vicinity, but this area is not located adjacent to potential foraging habitats within the Project area, which include annual grassland and fields on the western end of the Project.</td>
</tr>
</tbody>
</table>
## Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)

<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Yellow-breasted chat</strong> <em>(Icteria virens)</em></td>
<td>SSC</td>
<td>Early successional riparian habitats with a well-developed shrub layer and an open canopy. Nesting habitat is usually restricted to the narrow border of streams, creeks, sloughs, and rivers. Blackberry, wild grape, willow, and other plants that form dense thickets and tangles are frequently selected as nest sites. Forages and nests within 10 ft of the ground. Taller trees, such as cottonwood and alder, are required for song perches.</td>
<td>Species was not observed during field surveys and is not expected to occur in the Project area due to a lack of well-developed riparian shrub layer in riparian habitat. Nearest mapped occurrence is approximately 11 miles south.</td>
</tr>
</tbody>
</table>

**Mammals**

<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sierra Nevada snowshoe hare</strong> <em>(Lepus americanus tahoensis)</em></td>
<td>SSC</td>
<td>Occurs in riparian communities characterized by thickets of deciduous trees and shrubs such as willows and alders, forest undergrowth, dense thickets of young conifers, and patches of chaparral. Typically spends the day in forms under evergreen bushes, dense thickets of willows, logs, or jumbled piles of fallen trees or shrubs. Snowshoe hares are active year-round and are most active at night and early morning, moving via runways to reach feeding areas. They seldom venture into open spaces or mature closed canopy conifer forests.</td>
<td>Species was not observed during surveys. Species is not expected to occur within the Project area due to elevation. Nearest mapped occurrence is approximately 5 miles east.</td>
</tr>
</tbody>
</table>
### Table 1.12-2  TES Wildlife Species Potentially Occurring Within the Project Area (continued)

<table>
<thead>
<tr>
<th>Species (scientific name)</th>
<th>Status1/</th>
<th>Habitat Requirements</th>
<th>Potential to Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotted bat <em>(Euderma maculatum)</em></td>
<td>SSC</td>
<td>Arid deserts, grasslands, and mixed conifer forests. Feeds in flight, over water, and near the ground. Feeds almost entirely on moths. Prefers to roost in rock crevices. Occasionally found in caves and buildings. Cliffs provide optimal roosting habitat.</td>
<td>Potential foraging habitat occurs in the Project area, but Project implementation is not expected to adversely affect foraging activities. Roosting habitat in the form of rock crevices exists in south-facing cliffs across from the Project, and marginally suitable roosting habitat exists along the steep north-facing slope between the Project reach and penstock/pipeline alignment. Nearest mapped occurrence is approximately 4.5 miles southeast.</td>
</tr>
</tbody>
</table>

1/ FE = Federally Endangered, FT = Federally Threatened, FD = Federally Delisted, FPT = Federally Proposed Threatened, CAE = California Endangered, CAT = California Threatened, CACT = California Candidate Threatened, CAFP = California Fully Protected, SSC = California Species of Special Concern, WL = California Watch List, and BCC = USFWS Bird of Conservation Concern
1.12.1.3 Plants

Field surveys of the Project area were conducted to identify occurrences of TES and special-status plant species within the Project area and to assess the suitability of habitats within the Project area to support TES and special-status plant species (see Appendix F). Field surveys for TES and special-status plant species were conducted within a 400-foot corridor centered on the Project alignment.

A pre-field review of relevant literature, maps, and vegetation mapping of the Project area indicates that the area includes potential habitat for several special-status plant species (Table 1.12-3). Additionally, several special-status plant species have known occurrences within the vicinity of the Project area (Table 1.12-3; Figure 1.12-1). Table 1.12-3 lists TES and special-status plant species with potential to occur within the Project area. Figure 1.12-1 illustrates documented TES and special-status plant species occurrences within 10 miles of the Project area. Based on a review of the 14 USGS 7.5-minute quadrangles encompassing and surrounding the Project area (USFWS 2013d), only one federally-listed species, slender Orcutt grass (*Orcuttia tenuis*) is known to occur in the vicinity of the Project area (Table 1.12-3). This species, however, is not known to occur in the Project area and is known from vernal pools, a habitat type that is not known to occur in the Project area. Additionally, the Project area is not located within designated critical habitat for slender Orcutt grass (USFWS 2013c).

One special-status plant species, long-fruit jewelflower (*Streptanthus longisiliquus*), was observed during previous botanical surveys of the hydroelectric portion of the Project area (DGBP 2002, 2012; Contour 1995). Additionally, starry clarkia (*Clarkia stellata*), a former special-status plant species was observed during previous botanical surveys. Since these surveys, starry clarkia has been removed from all special-status species list. The transmission line ROW was not surveyed during previous studies.

No state or federally listed plant species were observed during field surveys of the Project area conducted in 2013. One special-status plant species, Coleman’s rein orchid (*Piperia colemanii*), a CNPS list 4.3 species, was observed. Eight individuals of this species were observed in one location in the central portion of the Project area along the proposed transmission line route. These individuals were growing on a southwest facing slope in an area of second-growth Sierran mixed conifer forest that had been relatively heavily burned in the fires of 2012. The area had a relatively open canopy cover and a sparse shrub and herbaceous layer. Associated species include ponderosa pine, manzanita, canyon live oak, goosefoot violet (*Viola purpurea*), many flowered brodiaea (*Dichelostemma multiflorum*), blue dicks, three toothed horkelia (*Horkelia tridentata* ssp. tridentata), diamond petaled clarkia (*Clarkia rhomboidea*), slender bird’s beak (*Cordylanthus tenuis* ssp. *viscidus*), woolly sunflower (*Eriophyllum lanatum*), and Torrey’s monkeyflower (*Mimulus torreyi*).
## Table 1.12-3. Special-status Plant Species with Potential to Occur within the Project Area

<table>
<thead>
<tr>
<th>Scientific Name Common Name</th>
<th>Status Federal/ State/ CNPS</th>
<th>California Distribution</th>
<th>Habitat Description</th>
<th>Blooming Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allium sanbornii var. sanbornii Sanborn’s onion</td>
<td>-/-/4.2</td>
<td>Cascade Range foothills and Sierra Nevada Foothills, from Shasta County to Calaveras County; Oregon. Documented approximately 0.75 mile north of proposed project alignment.</td>
<td>Gravelly or usually serpentine soils in chaparral, cismontane woodland, and lower montane coniferous forest; 260-1,510 meters (850 - 4,950 feet).</td>
<td>May–Sep</td>
</tr>
<tr>
<td>Betula glandulosa Dwarf Resin Birch</td>
<td>-/-/2B.2</td>
<td>Cascade Range, Warner Mountains; also Oregon, Washington, and elsewhere. In California known from Butte, Lassen, Modoc, Plumas, Siskiyou, and Tehama counties.</td>
<td>Wet areas in bogs and fens, meadows and seeps, marshes and swamps, lower montane coniferous forest, subalpine coniferous forest; 1,310-2,300 meters (4,300 – 7,545 feet).</td>
<td>May–June</td>
</tr>
<tr>
<td>California macrophylla Round-leaved filaree</td>
<td>-/-/1B.1</td>
<td>Scattered occurrences in Great Valley, southern North Coast Ranges, San Francisco Bay Area and elsewhere in California. Known from Tehama County.</td>
<td>Cismontane woodland, valley and foothill grassland on clay soils; 15-1,200 meters (50 – 3,950 feet).</td>
<td>Mar–May</td>
</tr>
<tr>
<td>Calochortus syntrophus Callahan’s mariposa lily</td>
<td>-/-/1B.1</td>
<td>Previously known from only fewer than five occurrences in Shasta County. Documented on private land approximately 0.75 mile west of the Project area.</td>
<td>Cismontane woodland, lower montane coniferous forest; vernal and mesic valley and foothill grassland. 525-855 meters.</td>
<td>May–June</td>
</tr>
<tr>
<td>Chaemascyce ocellata ssp. rattanii Stony Creek spurge</td>
<td>-/-/1B.1</td>
<td>Northern Sacramento Valley in Colusa, Glenn, and Tehama counties.</td>
<td>Chaparral, sandy or rocky areas in valley and foothill grassland; 85-800 meters.</td>
<td>May–Oct</td>
</tr>
<tr>
<td>Clarkia borealis ssp. arida Shasta clarkia</td>
<td>-/-/1B.1</td>
<td>Cascade Range foothills, Shasta and Tehama Counties (near Shingletown).</td>
<td>In open grassy areas in oak woodland, lower montane coniferous forest; 490-595 meters (1,600 – 1,950 feet).</td>
<td>June–Aug</td>
</tr>
<tr>
<td>Cryptantha crinita Silky Cryptantha</td>
<td>-/-/1B.2</td>
<td>Shasta and Tehama Counties.</td>
<td>Cismontane woodland, lower montane coniferous forest, riparian forest and woodland, valley and foothill grassland on gravelly streambeds; 61-1,215 meters (200 – 4,000 feet).</td>
<td>Apr–May</td>
</tr>
<tr>
<td>Scientific Name Common Name</td>
<td>Status Federal/State/CNPS</td>
<td>California Distribution</td>
<td>Habitat Description</td>
<td>Blooming Period</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
<td>--------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Didymodon norrisii Norris' beard moss</td>
<td>-/-/2B.2</td>
<td>Scattered occurrences in California: Contra Costa, Colusa, Humboldt, Lake, Los Angeles Madera, Monterey, Nevada, Plumas, San Benito, Santa Cruz, Sierra, Shasta, Sonoma, Tehama, Tulare, and Tuolumne Counties; Oregon.</td>
<td>Intermittently wet areas in rock outcrops in cismontane woodland, lower montane coniferous forest; 600-1,973 meters (1,970 – 6,475 feet).</td>
<td>--- (moss)</td>
</tr>
<tr>
<td>Fritillaria eastwoodiae Butte County fritillary</td>
<td>-/-/3.2i</td>
<td>Sierra Nevada Foothills, from Shasta to El Dorado counties; Documented from Lyonsville 7.5' Quadrangle; the nearest known occurrence is approximately 0.12 mile northwest of Project area.</td>
<td>Chaparral, cismontane woodland, openings in lower montane coniferous forest, sometimes on serpentine; 50-1,500 meters (165 – 4,920 feet).</td>
<td>Mar–June</td>
</tr>
<tr>
<td>Horkelia daucifolia var. indica Jepson's horkelia</td>
<td>-/-/1B.1</td>
<td>Known from fewer than five occurrences in northern Sacramento Valley in Shasta and Tehama Counties.</td>
<td>Quaternary pyroclastic flows, clay, volcanic, verna tally mesic, openings in Cismontane woodland; 240 - 670 meters (780 – 2,200 feet).</td>
<td>Apr–June</td>
</tr>
<tr>
<td>Juncus digitatus Finger rush</td>
<td>-/-/1B.1</td>
<td>Known from only two occurrences in Shasta County (including one just west of Shingletown); additionally recently found in Nevada County.</td>
<td>Openings in cismontane woodland and lower montane coniferous forest, xeric sites in vernal pools: 660-790 meters (2,165 – 2,600 feet).</td>
<td>(Apr) May–June</td>
</tr>
<tr>
<td>Juncus leiospermus var. leiospermus Red bluff dwarf rush</td>
<td>-/-/1B.1</td>
<td>Northern Sacramento Valley and Cascade Range foothills with occurrences in Butte, Placer, Shasta, and Tehama Counties.</td>
<td>Seasonally wet areas in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, vernal pools; 35-1,020 meters (115 - 3,350 feet).</td>
<td>Mar–May</td>
</tr>
<tr>
<td>Limnanthes floccosa ssp. floccosa woolly meadowfoam</td>
<td>-/-/4.2i</td>
<td>Northern Sacramento Valley and Cascade Range foothills, from Siskiyou County to Butte County; Oregon. Nearest known occurrences is approximately 1.5 miles southeast of the Project area.</td>
<td>Seasonally wet areas in chaparral, oak woodland openings, Valley and foothill grassland, vernal pools; 60-1095 meters (195 – 3,600 feet).</td>
<td>Mar–May(Jun)</td>
</tr>
<tr>
<td>Orcuttia tenuis Slender Orcutt grass</td>
<td>T/E/1B.1</td>
<td>Sierra Nevada and Cascade Range foothills from Siskiyou to Sacramento counties. Known occurrences from Tehama County.</td>
<td>Vernal pools; 35-1,760 meters (115 – 5,775 feet).</td>
<td>May–Sep(Oct)</td>
</tr>
<tr>
<td>Paronychia ahartii Ahart's paronychia</td>
<td>-/-/1B.1</td>
<td>Northern Central Valle in Butte, Shasta, and Tehama Counties.</td>
<td>Cismontane woodland, valley and foothill grassland, vernal pools; 30-510 meters (100 – 1,673 feet).</td>
<td>Mar–Jun</td>
</tr>
</tbody>
</table>
Table 1.12-3. Special-status Plant Species with Potential to Occur within the Project Area (continued)

<table>
<thead>
<tr>
<th>Scientific Name Common Name</th>
<th>Status Federal/ State/ CNPS¹</th>
<th>California Distribution</th>
<th>Habitat Description</th>
<th>Blooming Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Piperia colemanii</em> Coleman’s rein orchid</td>
<td>-/-/4.3²</td>
<td>Scattered distribution along eastern Central Valley and foothills from Siskiyou County to Tulare County. Documented approximately 0.10 mile northwest of the Project area.</td>
<td>Chaparral and lower montane coniferous forest, often on sandy soils; 1,200-2,300 meters (3,930 - 7,545 feet).</td>
<td>Jun-Aug</td>
</tr>
<tr>
<td><em>Rhynchospora capitellata</em> Brownish beaked-rush</td>
<td>-/-/2B.2</td>
<td>Scattered occurrences in Northwestern California and northern Sierra Nevada Foothills. Known from Tehama County.</td>
<td>Wet areas in lower and upper montane coniferous forest, meadows and seeps, freshwater marshes and swamps; 45-2,000 meters (145 - 6,560 feet).</td>
<td>Jul-Aug</td>
</tr>
<tr>
<td><em>Rupertia hallii</em> Hall’s rupertia</td>
<td>-/-/1B.2</td>
<td>Sierra Nevada Foothills in Butte and Tehama Counties.</td>
<td>Cismontane woodland, lower montane coniferous forest, sometimes on disturbed soils often on roadsides and sometimes in openings and logged forests; 545-2,250 meters (1,790 - 7,380 feet).</td>
<td>June-Aug (Sep)</td>
</tr>
<tr>
<td><em>Silene occidentalis</em> ssp. <em>longistipitata</em> Long-stiped campion</td>
<td>-/-/1B.2</td>
<td>Southern high Cascade Range in Tehama, Butte, Plumas and Shasta Counties. Documented approximately 2.4 miles south of the Project area.</td>
<td>Chaparral, upper and lower montane coniferous forest; 1,000-2,000 meters (3,280 - 6,560 feet).</td>
<td>June-Aug</td>
</tr>
<tr>
<td><em>Stellaria obtusa</em> Obtuse starwort</td>
<td>-/-/4.3²</td>
<td>North Coast Ranges, Cascade Range, northern and central Sierra Nevada, and Modoc Plateau: in Butte, Glenn, Humboldt, Lassen, Nevada, Plumas, Shasta, Sierra, Tehama, and Tuolumne Counties; Idaho, Oregon, Washington and elsewhere. Documented approximately 4.5 miles to the southeast of the Project area.</td>
<td>Mesic areas in lower and upper montane coniferous forest, riparian woodland; 150-2135 meters (490 - 7,005 feet).</td>
<td>May-Sep (Oct)</td>
</tr>
<tr>
<td><em>Streptanthus longisiliquus</em> Long-fruit jewelflower/Pit River jewel flower</td>
<td>-/-/4.3²</td>
<td>Butte, Tehama, Shasta Counties Previously documented in Lassen Lodge Project area.</td>
<td>Rocky volcanic outcrops in lower montane coniferous forest; 745-1,340 meters (2,440 - 4,400 feet).</td>
<td>Apr-Sept</td>
</tr>
</tbody>
</table>

1/ Status explanations: Federal: E = listed as endangered under the ESA; – = no listing. State: E = listed as endangered under the CESA; – = no listing. *California Native Plant Society (CNPS) Ranks:* 1A = presumed extirpated in California and either rare or extinct elsewhere; 1B = rare, threatened, or endangered in California and elsewhere; 2B = rare, threatened, or endangered in California but more common elsewhere; 3 = Review list, plants about which more information is needed; 4 = Watch List, plants of limited distribution; CNPS Code Extensions: 0.1 = seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat); 0.2 = fairly endangered in California (20-80% of occurrences threatened).

2/ CNPS Rank 3 and 4 species were only included if they are known to occur in the Project vicinity.
Figure 1.12-1   Documented Special Status Plant Species Occurrences within the Vicinity of the Project Area\(^1\)

<table>
<thead>
<tr>
<th>Project Features</th>
<th>National Park Service</th>
<th>State</th>
<th>US Forest Service</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Centerline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-mile Buffer of Project Centerline</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Jurisdiction</td>
<td>Bureau of Land Management</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CHDDB Occurrence

- Allium sanbornii var. sanbornii
- Botrychium crenulatum
- Calochortus syntrophus
- Chamaesyce ocellata ssp. rattanii
- Eriogonum pyrolifolium var. pyrolifolium
- Frillilaria eastwoodiae
- Horkelia daucifolia var. indica
- Limnanthes floccosa ssp. floccosa
- Meesia uliginosa
- Mielichhoferia tehamensis
- Orostemma elatum
- Panicum acuminatum var. thermale
- Paronychia arhartii
- Piperia colemanii
- Silene occidentalis ssp. longistipitata
- Stellaria obtusa

\(^1\) Locations based on all available data from CHDDB and SPI databases.
1.12.2 Project Impacts and Proposed Mitigation

1.12.2.1 Fisheries

Project Impacts
As access to the Project area by Chinook salmon and steelhead is blocked by downstream barriers, there will be no direct or indirect effects of the proposed action to individuals. No effects are expected during construction as construction will occur well upstream of the current accessible range of salmonids and will be completed well before the BCSSRP will be completed that may eventually extend to this range. Project operations will also have no effect on Chinook salmon and steelhead because these species are not able to access the Project area. Indirect effects are those effects that are caused by or will result from a proposed action, and are later in time but are still reasonably certain to occur. As all water is returned to the SF Battle Creek at the powerhouse location well upstream of anadromous salmonid presence, no indirect effects of the proposed action are expected on Chinook salmon or steelhead. No incidental take of Chinook salmon or steelhead individuals is expected as a result of the proposed action. Therefore, no direct or indirect effects would occur to these two listed fish species. Potential effects of the Project on these federally listed fish species would be limited to effects to their designated critical habitat discussed below.

Potential direct and indirect effects to designated Chinook salmon and steelhead critical habitat in the Project area are associated with temporary construction actions and subsequent operation activities. Specific impacts from construction activities could result from turbidity, loss of food resources and habitat, construction debris, or disturbance and noise. Impacts from operation activities include the effects of the minimum instream flow in the bypass reach on habitat and production potential for spring-run Chinook salmon and steelhead. As all water is returned to the SF Battle Creek at the powerhouse location, no direct effects are expected on Chinook salmon or steelhead critical habitat downstream of the Project area and therefore no indirect effects are expected either.

Construction Impacts
The only construction action that would occur where the Project area and critical habitat overlap is the construction of the tailrace. While there are Project actions at the intake area that could have some potential immediate effects on stream habitat during in-water construction, any potential effects would be insubstantial by the time waters reach critical habitat of steelhead about 0.7 mile downstream, below Angel Falls. The tailrace would carry tailwater from the powerhouse through a the buried concrete box culvert (8 by 6 by 70 feet) and outlet at invert elevation of 3,417 feet to cascade 9 feet over existing large boulders to the rock-strewn streambed (elevation 3,408 feet). The observed high-water mark (1997 100-year event) elevation
is 3,414 feet and approximately 3 feet below the tailrace exit invert elevation. Tailwater exit velocity is projected not to exceed 3 feet per second at maximum operating flow.

Technically, all construction of the tailrace would be outside of the ordinary high water mark and occur in the dry. However, all construction actions that could potentially contribute increased suspended sediment turbidity from upslope areas would follow detailed plans to prevent substantial overland runoff to creek the from such activities as the penstock route, associate road construction and stream-side clearing. Additionally, any in-channel construction would occur within the designated work window or with an approved extension.

Sedimentation or erosion as a result of construction may increase turbidity downslope and in the wetted area of the SF Battle Creek. These actions have the potential to directly interfere with the soil-water interface and affect bottom sediments composition. In order to avoid or minimize potential impacts related to sedimentation or erosion, a SWPPP would be developed and implemented in coordination with the RWQCB Section 401, the construction stormwater permit, and the dewatering permit. All requirements from the Water Quality Certification and other permits would be followed; those requirements would be mandated to prevent the degradation of surface water quality. These actions, combined with the conservation measures outlined below and plans for construction to occur in the dry, would keep effects from turbidity short term and minimal.

A short-term increase in turbidity and suspended sediment levels could, however, potentially affect habitat including increased fines in potential spawning habitat by reducing egg survival, primary productivity due to decreased light penetration in the water column, and resulting food-web productivity. Resuspension of sediments could also transiently deposit on adjacent areas and reduce other invertebrate species growth. Nevertheless, given that the work would need to meet California State Surface Water Quality Standards during construction, as well as incorporate BMPs and implementation of erosion control and sedimentation plans, measures to address the above impacts would be implemented, and no significant effects are expected to primary productivity or food-web productivity.

No destruction or adverse modification of existing critical habitat in the Project area would result from Project construction or operation.

**Operation Impacts**

The proposed Project would divert a portion of the SF Battle Creek flow into a penstock at RM 23, above Angel Falls (RM 22.3), and deliver the water to a powerhouse at RM 20.6. All flow would return to the river at the powerhouse tailrace. The proposed minimum instream flow of 13 cfs that is to be maintained in the bypass reach was assessed to determine effects on spring-run Chinook salmon and steelhead critical habitat in the Cramer and Ceder (2013) report (see
Appendix C). The proposed 13 cfs bypass flow was modeled to determine the effects on the carrying capacity of the bypass reach on the designated critical habitat primary constituent habitat elements (PCEs) found in the Project area for Chinook Salmon Central Valley ESU and Central Valley Steelhead DPS. PCEs for both species that are found in the Project area include freshwater spawning and rearing sites and freshwater migration corridors. The potential effects on critical habitat from the Project operations are described in Appendix D (Biological Assessment) and are summarized below. Additionally, the details of the impacts of Project operations on potential future spawning and rearing habitat of these two listed species are provided in Appendix C and summarized below.

Suitable rearing habitat for anadromous salmon is most constrained for fish at the stage they reach just before emigrating to sea (Cramer and Ackerman 2009). The rearing constraint for steelhead and Chinook salmon generally occurs at the lowest flows reached during their last summer-fall season in freshwater. A different set of habitat features constrains the capacity of adult spawning; in the case of steelhead, spawning occurs at a different season (winter-spring) and range of flows than would constrain rearing (late summer-fall).

Spawning of spring-run Chinook salmon peaks in September, during some of the lowest flows of the year. The model simulations showed that the small area and shallow depths of gravel patches at 9 cfs (median natural September flow) provided suitable space for only one Chinook redd in the entire Project reach. The Project would not be operating during this low-flow period, and there would thus be no effect on Chinook salmon spawning habitat if the fish were able to access the Project area during this time. Minimum flows bypassed by the Project would also supply more than enough suitable rearing habitat for any juvenile Chinook salmon that could be produced by the naturally limited spawning area available. Therefore, production of spring Chinook salmon is limited by low flows in September when the Project would not operate, so the prescribed minimum flows would not limit Chinook salmon spawning habitat.

Steelhead, on the other hand, are limited by the rearing capacity of the Project during the low-flow periods. The spawning capacity for steelhead is sufficient to produce far more parr than the rearing habitat can support. Even though adult steelhead could find ample habitat to spawn in if they could gain access to the Project reach, the low flows in the summer sharply constrain the number of parr that can be supported. The proposed Project operations, including minimum flow of 13 cfs in the bypass reach, would maintain adequate spawning habitat for steelhead spawners to fully seed the rearing habitat capacity of the bypass reach for steelhead. Project operations would not use flow during the lowest flow periods that naturally restrict rearing capacity, so the prescribed minimum flows would not affect potential production of this DPS.

The Project should have little effect on stream temperature, because diversions would cease during summer when flows drop below the prescribed minimum, typically in early July.
During May through October, stream temperatures on any given day are warmest at the top end of the reach and decrease as they pass downstream to the site of the powerhouse due to increased stream-side shading and naturally cool groundwater inflows. To evaluate Project effects on temperature, it is important to consider the temperature of water arriving through the penstock from the powerhouse and the water arriving to the powerhouse site through the natural stream channel. Since the penstock is fully buried in the ground, which has an average annual temperature of 12.8°C (55°F), it is reasonable to expect that water entering the penstock at greater than 12.8°C (55°F) would arrive at the powerhouse site cooler than when it entered the penstock. Daily average temperatures within the bypass reach during summer typically remain within the optimum temperature of 10 to 16°C (50 to 61°F) for steelhead growth and physiology. No water would typically be diverted during mid-July to early August, since the Project would not operate at low flows, so temperatures would be unaltered from their natural state during the critical season of warmest temperatures.

Water typically cools during summer over the stretch from the powerhouse to Panther Grade and then receives an inflow of 12 to 15 cfs from springs with temperatures under 10°C (50°F) even into early September. The water temperature from springs is typically quite stable, so this inflow would cool the river during summer and warm the river during winter. Thus, temperatures near the base of Panther Grade should remain well within the optimal range for native salmon and trout through the summer and not be adversely affected by Project operations.

**Effects to Spring Chinook Salmon Central Valley ESU PCEs**

The baseline condition of the freshwater PCEs of SF Battle Creek is not properly functioning due primarily to the presence of downstream fish passage obstructions prohibiting Chinook salmon from accessing the upper reaches of SF Battle Creek. Additionally, high temperatures during low-flow conditions are at extremes that create stressful conditions that can lead to mortality of salmonids. High temperatures extend into the timing of spring Chinook salmon holding and may cause pre-spawning mortality if Chinook salmon are present. Furthermore, existing substrate and gravel patch sizes are less than optimum for Chinook salmon, as are velocities during their typical spawning period. Rearing habitat is also limited due to low flows and high temperatures. Lack of existing cover habitat at low flows creates high concern for predation by birds and mammals during summer months. If Chinook salmon were present in the Project area, many limiting elements of the PCEs would affect their survivability under existing conditions.

In summary, operational impacts are not expected to affect the amount of functioning freshwater habitat PCEs for Chinook salmon, as the limiting factors of the existing conditions occur when the Project is not in operation.
Effects to Steelhead Central Valley DPS PCEs

The baseline condition of the freshwater PCEs of SF Battle Creek is not properly functioning due primarily to the presence of downstream fish passage obstructions prohibiting steelhead from accessing the upper reaches of SF Battle Creek. Additionally, high temperatures during low-flow conditions are at extremes that create stressful conditions that can lead to mortality of salmonids. Rearing habitat is limited due to the low flows and high temperature conditions. Lack of existing cover habitat at low flows creates high concern for predation during summer months. If steelhead were present in the Project area many limiting elements of the PCEs would affect their survivability.

Effects of the Project on PCEs of Relevance in the Project Area

The Project is likely to have the following effects on the PCEs of relevance in the Project area (Table 1.12-4).

Table 1.12-4. Summary of the Proposed Condition of the PCEs in the Project area

<table>
<thead>
<tr>
<th>PCE Function Description</th>
<th>Proposed Condition Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Valley Spring Chinook Salmon ESU and Central Valley Steelhead</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Freshwater Spawning Sites</td>
<td>No Change to IC</td>
<td>The Project would not be operating during Chinook salmon spawning season therefore would not affect Chinook salmon spawning conditions. During steelhead spawning, the minimum instream flow would support spawning capacity that can produce more juveniles than the rearing capacity can support.</td>
</tr>
</tbody>
</table>
Table 1.12-4. Summary of the Proposed Condition of the PCEs in the Project area (continued)

<table>
<thead>
<tr>
<th>PCE Function</th>
<th>Proposed Condition Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Freshwater Rearing Sites</td>
<td>No Change to IC</td>
<td>Rearing capacity is naturally limited in the Project area during the low flow period for all salmonids. Additionally, the spawning capacity of steelhead during Project operations far exceeds what the rearing habitat can support under natural flows, when the Project is not operating. Rearing habitat is limited during natural flows in the summer due to a reduction in the depth and area of suitable habitat. Additionally, high predation risk and stress from low flows and high temperatures may also result.</td>
</tr>
<tr>
<td>3. Freshwater Migration Corridors</td>
<td>No Change to NPF</td>
<td>There would be no change to the migration corridor as a result of the proposed action. During Project operations the minimum instream flow of 13 cfs would affect only the 1.7-mile reach below Angel Falls. Passage through this reach is not expected to be limited at these flows throughout the Project area reach. All natural flows would be returned to the SF at the powerhouse location. Fish passage at Panther Grade would not be affected by the Project. Monitoring will detect if salmon or steelhead reach the project area, and mitigations measures are specified if passage within the reach is impaired at low flows. The condition of migration corridor is impaired by below project area hydroelectric structures and natural grade structures, such as Panther Grade, further downstream of the Project area.</td>
</tr>
</tbody>
</table>

IC - impaired  
NPF - not properly functioning  
PFC - properly functioning

Proposed Conservation Measures

A variety of conservation measures and BMPs will be implemented prior to or during construction to reduce the potential for direct and indirect effects to ESA-listed species and their critical habitats. These measures are designed to reduce or eliminate disturbance, turbidity, removal of biota, noise, debris falling into the water, and fish stranding. The full list of conservation measures is provided above in Section 1.4.2, Project Impacts and Proposed Mitigation.
Proposed Monitoring

Monitoring the potential arrival and success of spawning anadromous fish into the bypass reach would be triggered by the following cues. Monitoring by other agencies or programs related to the BCSSRP would be used to identify the presence of salmonids progressing up SF Battle Creek. When these programs are identified, the most upstream data point would be used to initiate further monitoring action within the Project vicinity.

Until these additional upstream monitoring plans are identified, monitoring at Inskip Dam is proposed. Adult salmon and steelhead must pass Inskip Dam to reach the Project area, and the fishway at Inskip is to be equipped with video counting equipment operated by CDFW or USFWS. Currently, this is the highest known monitoring point. Subject to a monitoring point located farther upstream at a later date, confirmation of anadromous fish passing Inskip Dam during migration seasons (spring Chinook salmon passing by July 1 or steelhead passing by June 1) would trigger further monitoring upstream.

To determine if adult anadromous fish are within the bypass reach, the following actions would take place. No Chinook salmon are anticipated to pass and remain above Panther Grade. To confirm that assumption, a two-person snorkel survey would be completed during low flows in August to count any adult Chinook salmon present from the powerhouse to the upstream limit of critical habitat. Adults should be easily visible in the clear water and should be holding only in pools, due to low flows. Surveys would cease after 4 consecutive years with zero Chinook salmon observed. Spawning flows in September would not be affected by the Project so spawning locations would not be surveyed.

Although it is unlikely that steelhead would pass above Panther Grade except under rare circumstances, the risk of error in that conclusion can be limited by monitoring for successful spawning by steelhead within the 1.7 miles above Panther Grade up to the Project powerhouse. The key issue is to detect successful reproduction above Panther Grade and within the 1.7-mile reach below the powerhouse where full natural flows are present, because any initial expansion of steelhead distribution above Panther Grade could be readily accommodated there. Lack of steelhead in that reach would not be an effect of the Project. If steelhead reproduction is consistently detected over several (more than 3) years within that stream section, then the possible impediments to passage above the powerhouse, and flows at which they occur, should be evaluated.

Any migration over Panther Grade would be during the high-flow season, and steelhead would be extremely difficult to detect during that season, including during spawning. Therefore, the most effective way of detecting steelhead presence would likely to be through DNA sampling of emergent fry that appear in the shallow stream margins in June. Available genetic evidence (Garza and Pearse 2010) indicates that DNA of the rainbow trout in the Project area is likely
unique enough that even a single offspring from a wild steelhead may be identifiable as unique from the resident trout population. Garza and Pearse (2010) analyzed DNA genotypes using 18 highly-variable microsatellite markers from 17 *O. mykiss* populations in the Central Valley. These populations included fish from Battle Creek, Deer Creek, Butte Creek, Feather River, and Yuba River. Garza and Pearse (2010) found that rainbow trout populations above natural barriers to anadromy within the Central Valley tended to be more similar to each other across basins than they were to populations downstream in the same river where anadromous individuals spawned. Thus, it is expected that the rainbow trout population above Panther Grade may well be genetically distinct from populations in the lower portions of Battle Creek, and in that case would be uniquely adapted to the environment within the upper South Fork.

DNA samples of juveniles above Panther Grade would be used to determine the proportion of juveniles produced by steelhead, and an estimate for the minimum number of steelhead breeders that produced juveniles could be back-calculated.

It would be necessary to confirm whether the DNA patterns of rainbow trout in the Project reach are distinctive enough from wild steelhead at the Coleman weir, in order for DNA to distinguish if any juveniles in the Project reach were parented by steelhead. This would be accomplished by collecting tissue samples (scales or fin tissue) from 50 fish sampled at each of four locations: 1) above Angel Falls, 2) in the Project bypass reach, 3) near Inskip Dam, and 4) at the Coleman weir. DNA samples at the four locations are needed to reveal a pattern of change from the anadromous to the resident ancestry as a function of distance up Battle Creek. The methods used for DNA analysis are the same as those used by NOAA Fisheries geneticists. Capture of fish to obtain tissue samples can be accomplished by electrofishing, angling, baited minnow traps, or seining.

This DNA analysis of genotypes would enable us to conclude with confidence whether steelhead were ever able to reach the Project area before dams were constructed. If steelhead had spawned there prior to installation of PG&E dams downstream in Battle Creek, the genetic signal of steelhead ancestry would still be detectable in rainbow trout within the Project area (steelhead and rainbow are the same species and would have interbred). If the steelhead DNA was found there, it would signal that steelhead spawned within the Project area in the past.

If the previous activity confirms that genetics can distinguish steelhead from the resident rainbow, tissue samples from 50 juveniles each at three locations between the powerhouse and Angel Falls would be collected to estimate the proportion of age 0 juveniles that were parented by steelhead. Distinction of resident and anadromous forms would be probabilistic rather than absolute, so a small fraction of steelhead would likely be estimated present even when none are. Therefore, an estimated 20 percent steelhead parentage is a reasonable value to signal high likelihood that steelhead did contribute to spawning. A more precise percentage that signals
steelhead presence would be determined from the results of the diagnostic genetic sampling activity. The sampling at three locations would enable detection of how far up the bypass reach the steelhead spawned.

Sampling would continue 4 years. If age 0 steelhead are detected in the bypass reach in 2 of 3 years (1 year space of absence), then actions described in the mitigation plan would be implemented. Frequency of less than 2 out of 3 years present would indicate that access to the Project area is opportunistic and not sufficient to sustain a population.

On the other hand, if the diagnostic genetic sampling indicates that steelhead DNA would not be distinguishable from that of the resident trout, spawning surveys would be implemented as the alternative method for detecting steelhead presence. Foot surveys would be completed once in mid-April and once in mid-May to identify the number and location of redds or spawning steelhead. Access would be difficult when water is high, so the area that could be adequately surveyed would have to be determined when and if surveys were initiated.

**Proposed Mitigation**

In the event that anadromous salmonids are detected in the bypass reach through the proposed monitoring activities, the following mitigation measures could be implemented to ensure their sustainability and reduce potential effects from the Project operations.

If steelhead are detected up to the base of the powerhouse, then passage impediments to desirable spawning areas upstream of the powerhouse could be evaluated for the flow at which they are passable. Results of the genetic sampling to two locations upstream of the powerhouse will be used to determine if access to either of those locations failed in any of the years that steelhead were detected up to the powerhouse. If access to all three sample locations is detected in every year that steelhead are detected at the powerhouse, then no further evaluation of passage impediments is required.

If evaluation of passage impediments is required, two steps of mitigation will be pursued. First, the Project operations would be modified. Sellheim and Cramer (2013) identified several locations within the project reach where passage was not possible when flow was only 13 cfs, but the flow needed to allow passage was highly uncertain due to the unique channel configuration at each site. It appeared, based on professional judgment of the passage impediment at each location, that modest flows of 30 to 50 cfs (and possibly less) would be sufficient to enable passage between all channel units within the project reach. Whereas resident fish would have opportunity throughout the year to pass whenever such flows are available, steelhead could only pass during their migration period in mid-winter to mid-spring. Bypass flow will frequently, but at unpredictable intervals, reach the 30 to 60 cfs range during the runoff season when flows naturally exceed the project operating capacity of 108 cfs (95 cfs...
turbine capacity plus 13 cfs bypass flow). To ensure predictability of passage opportunity, if there are no flows that result in bypass flows of 30 cfs for a period of 2 days twice a month in the time from February 1 to May 15, diversion will be temporarily reduced as necessary to ensure that within each 2-week period from February 1 to May 15 there will be two consecutive daylight periods with flows in the bypass reach of at least 30 cfs, if such flows are available. Steelhead tend to pass difficult obstacles during daylight hours, and they tend to migrate to spawning areas more than a month before spawning. Thus, passage flow during daylight hours at least every 2 weeks will provide full access to spawning areas throughout the bypass reach.

Second, a team of two biologists approved by NOAA Fisheries would complete a survey of potential passage impediments in the bypass reach, and would establish photo points where pictures of the obstacle can be obtained across a range of flows. A committee of biologists approved by NOAA Fisheries would review the photos to provide their best estimate of the flow at which passage likely becomes available. If that team finds that barrier modification would be beneficial, the team may select up to four locations where blasting may be employed by the Project operator to modify an obstacle for ready passage over a wider range of flows. Following such modifications, the committee of biologists could reduce the passage flow required every 2 weeks, if observations indicated less flow was sufficient for passage.

1.12.2.2 Wildlife

**Project Impacts**

Potential impacts to TES wildlife species resulting from construction, operation, and maintenance of the Project are as described for wildlife and habitat in Section 1.5.2 and could include disturbance and displacement; habitat loss, degradation, and fragmentation; and mortality. Vegetation clearing, noise, potential introduction and/or spread of noxious weeds, and increased human activity may affect wildlife and their habitats during construction and operation of the Project.

**Proposed Mitigation**

Proposed mitigation measures to protect TES wildlife and minimize Project-related impacts include:

- Conduct preconstruction surveys in all areas of suitable habitat for TES and special-status wildlife species that, due to Project alignment changes, were not surveyed in 2013.
- Conduct preconstruction surveys for migratory birds within 100 feet of the Project (disturbance area) prior to construction if disturbance will occur during the nesting season (typically April 15 to July 31). If an active nest (containing eggs or young) of a bird species protected under the Migratory Bird Treaty Act is found during either
preconstruction surveys or construction activities, the nest will be identified to species, inconspicuously marked, and a 100-foot buffer will be implemented with vegetation left in place until any young have fledged.

- Conduct preconstruction pedestrian or aerial nest surveys in suitable habitat within 1 mile of the Project during the appropriate nesting time periods needed to identify raptor nest locations and establish the status of nests. Appropriate buffers will be applied to active nests during construction. All encounters of nesting raptors in the Survey Area will be reported to the biological monitor and to appropriate agencies.

- Preconstruction surveys will be conducted for bald eagles during the nesting season (February through July) within one year prior to construction. If an active nest is found, a 1-mile buffer will be implemented from January 1 to August 31, or until young have fledged.

- Preconstruction surveys for American peregrine falcons will be conducted during the nesting season (February through August) within 1 year prior to construction. If an active nest is found, a 0.5-mile buffer will be implemented from February 1 to August 31, or until young have fledged.

- Preconstruction surveys for golden eagles will be conducted during the nesting season (January through August) within one year prior to construction. If an active nest is found, a 1-mile buffer will be implemented from January 1 to August 31, or until young have fledged. If the nest is not within line of sight of the activity, then the buffer can be reduced to 0.5 mile.

- Preconstruction surveys for northern goshawks will be conducted during the nesting season (May through August) within one year prior to construction. If an active nest is found, a 0.5-mile buffer will be implemented from March 1 to August 15, or until young have fledged.

- Preconstruction surveys for ospreys will be conducted during the nesting season (March through August) within 1 year prior to construction. If an active nest is found, a 0.5-mile buffer will be implemented from April 1 to August 31, or until young have fledged.

- Preconstruction surveys for prairie falcons will be conducted during the nesting season (mid-February through mid-September) within 1 year prior to construction. If an active nest is found, a 0.25-mile buffer will be implemented from April 1 to August 31, or until young have fledged.

- Design and construct the transmission line in compliance with APLIC guidance to reduce impacts to avian species (APLIC 2006, 2012).
• Ponds identified as potentially suitable breeding habitat for California red-legged frogs will be avoided by at least 200 feet, and BMPs to prevent and minimize construction stormwater-related erosion and sedimentation will be implemented. Should ground-disturbing activity be required within 200 feet of ponds identified as potentially suitable breeding habitat for the California red-legged frog, these activities will not occur between November 15 and April 30, and no ground disturbance will occur within 50 feet of ponds identified as potentially suitable breeding habitat.

• In-water work and/or construction in riparian areas will be avoided during the time that egg masses of foothill yellow-legged frogs are present (typically mid-April through mid-May). Preconstruction surveys for juvenile and adult foothill yellow-legged frogs will be conducted immediately prior to construction if in-water work will occur during the breeding season (mid-March to August, depending on local water conditions). If egg masses are found, construction will be delayed until eggs have hatched. If juveniles or adults are found within the Project reach or 500 feet downstream, they will be relocated outside of the Project area (e.g., outside of the area of impact, immediately upstream of the Project area). Rocks shall not be collected from in-water environments between March 1 and August 31 to avoid disturbing foothill yellow-legged frogs, and disturbance to pools and slow runs will be minimized. Mitigation measures proposed for protection of fish (e.g., minimum in-stream flows) will provide long-term mitigation for cumulative impacts.

• To protect Sierra Nevada red fox and American pika, ground-disturbing activity on or near talus slopes will be avoided.

• Avoid potential bat roosting habitat, including rock crevices, cliffs, and snags.

• Employ biological monitors during construction to ensure that measures to protect biological resources are implemented appropriately.

1.12.2.3 Plants

Project Impacts
Potential impacts to TES and special-status plant species resulting from construction, operation, and maintenance of the Project are as described for botanical resources in Section 1.6.2 and could include removal or disturbance, habitat loss or degradation, and introduction and spread of non-native invasive plants, including noxious weeds. No federal or state listed TES species were observed during surveys of the Project area and designated critical habitat or potential habitat for TES plant species does not occur in the Project area; therefore, no impacts to TES species or their habitat from proposed Project activities are expected.
One special-status plant species, Coleman’s rein orchid, was observed during surveys of the Project area; however, proposed Project facilities have been sited to avoid this population. Therefore, Project impacts to known occurrences of special-status plant species are not expected. Due to minor Project alignment changes done to minimize site impact or to avoid cultural sites that occurred after the May and June 2013 field surveys, small areas of the current Project area were not surveyed during the appropriate flowering period to identify special-status plant species. Potential impacts to undetected populations of special-status plant species in the Project area are possible.

**Proposed Mitigation**

In addition to the proposed mitigation measures listed for botanical resources in Section 1.6.2.3, measures to protect TES and special-status plants and minimize Project-related impacts include:

- Provide environmental training to construction staff to educate them regarding laws, regulations, and BMPs to protect TES and special-status plant species and their habitats.
- Place exclusion fencing around known individuals and populations of special-status plant species to restrict access by construction equipment and personnel during construction.
- Conduct preconstruction surveys in all areas of suitable habitat for TES and special-status plant species that, due to Project alignment changes, were not surveyed in May and June 2013. These surveys will occur during the appropriate flowering periods needed to identify special-status plant species.
- If TES or special-status plant species are observed during preconstruction surveys the following will be implemented:
  - Project design will be revised to avoid impacting individuals and populations of TES and special-status plant species.
  - Exclusion fencing will be placed around populations of TES and special-status plant species to protect plants during construction.
  - If Project design cannot avoid TES or special-status plant species, individuals and populations of species that would be impacted will be transplanted and/or seeds will be collected and sown, in suitable locations outside the area of Project impacts.
  - If transplantation or relocation is not possible, conserve and monitor existing populations occurring outside the area of Project impacts.
1.13 PROJECT ALTERNATIVES

1.13.1 No Action Alternative

Under the No Action Alternative, the Project and associated features would not be constructed. The No Action Alternative would eliminate the local economic benefits for Tehama County, nearby communities, and other parties in the form of lease payments, tax revenues, and opportunities for employment resulting from this proposal. Under the No Action Alternative, the Project would not be constructed or operated, and the environmental impacts described in Exhibit E would not occur.

If the Project were not constructed, it is likely that the region’s need for power would be addressed by the development of new renewable and/or non-renewable generation sources. Baseload demand may be filled through expansion of existing, or development of new, thermal generation such as gas-fired combustion turbine technology. Other energy generation projects, using renewable energy resources and involving other sites in Tehama County and elsewhere in the region, may be proposed and could be pursued in response to a portion of those demands.

1.13.2 Alternatives including the Preferred Alternative

The Project and No Action Alternative were evaluated. A key objective for the Project is to avoid and minimize construction and operational impacts through the use of the approved Lassen Lodge roads, diversion dam, pipeline, penstock, powerhouse, substation, transmission line, and interconnection. The Project was specifically sited and designed to be constructed and operated in this location on SF Battle Creek and was designed to optimize the water resource. Alternative locations that meet this key objective do not exist and have not been analyzed.

1.13.3 Alternatives Considered but Eliminated from Further Analysis

Alternative project sizes, layouts, and turbine technologies were considered and eliminated from further analysis. Opportunities for alternative project size or turbine configurations are limited because the Project involves the construction and operation of an optimal capacity located within the limitations of the available water resource and the area of the Project Boundary.

2. CONSULTATION RECORD

The FERC requires a license applicant to consult with entities other than FERC staff prior to filing an application. An applicant must consult with the relevant federal, state, and interstate resource agencies, affected Indian tribes, and the public on project design, the impact of the proposed project, reasonable hydropower alternatives, and required studies. These
requirements are codified in 18 CFR 4.38 Consultation Requirements. The consultation process is a three-stage approach that includes Notice of Intent to File, preparation of preliminary design documents and project description, public hearings, consultation with resource agencies and Indian tribes, preparation and distribution of a Draft License Application, response to comments on the draft license application, and preparation of a Final License Application and submittal to FERC and all consulted entities.

Details of the consultation process to date are provided below.

**2.1 SUMMARY OF CONSULTATION PROCESS**

**2.1.1 Initial Consultation and Scoping Process**

Rugraw has been engaged in studying the Lassen Lodge Project since the early 1990s. Rugraw originally filed an application for license for the Lassen Lodge Project (P-11157) in October 1994, amending the application in October 1996. The FERC conducted two scoping meetings and a site visit in May 1998. The application, however, was dismissed (without prejudice) in July 1999.

Rugraw distributed an Initial Information Package for comments and study requests in June 2001 (distribution letter in Appendix K). Agency comments on the Initial Information Package are located in the FERC docket and include comments from CDF&G, PG&E, NMFS, U.S. Department of Interior, and American Whitewater & Shasta Paddlers. Rugraw then conducted a joint agency/public meeting and a site visit in August 2001 and a second meeting on November 29, 2001. The purpose of the meetings was to review the license application progress and address any information needs that may be requested from the agencies. On March 26, 2001 Rugraw provided agencies and stakeholders with Scoping Document 1 (SD1) and a notification of upcoming scoping meetings. The FERC conducted two public and agency scoping meetings and a site visit during April 2002.

At the scoping meetings, Rugraw and the FERC staff: (1) summarized the environmental issues tentatively identified for analysis; (2) solicited from the meeting participants all available information, especially quantifiable data, on the resources at issue; (3) encouraged statements from experts and the public on issues that should be analyzed, including viewpoints in opposition to, or in support of, the staff’s preliminary views; (4) determined the resource issues to be addressed; and (5) identified those issues that require a detailed analysis, as well as those issues that do not require a detailed analysis.

The preliminary permit for project P-11894 was due to expire in June 2004. Rugraw sent a letter dated February 12, 2004, to the FERC requesting a 12-month extension of the permit. The purpose of the extension was to complete studies that were in progress recommended by the resource agencies and from requests during public meetings. Rather than submit a partial
license application without all studies included, Rugraw was requesting the extension to complete all studies and file a complete license application.

The FERC responded in a letter dated March 2, 2004, that the permit was issued for a period of 36 months and it did not have the authority to extend the expiration beyond that period of time. They further recommended that Rugraw file a new application for another preliminary permit. On May 5, 2004, Rugraw submitted a new permit application to the FERC and that was accepted as of May 10, 2004, and assigned project number P-12496. On October 8, 2004, FERC issued the actual permit.

Throughout the remainder of 2004 and into 2005, Rugraw continued to conduct studies that had been identified in previous meetings with the agencies and stakeholders. On May 2, 2006, FERC sent a letter to Rugraw requesting an update on progress toward preparation of a license application. The letter noted that little or no progress had been made toward the development of a license application since Rugraw filed the last 6-month progress report on March 25, 2005. The letter further indicated that Rugraw must demonstrate why the FERC should not rescind authorization to use the Alternative Licensing Process (ALP) for the preparation of the license application. FERC required within 30 days of the filing of a response to include: (1) an estimated timeline for the initiation and/or completion of future and ongoing studies, as identified within the March 30, 2006, progress report; and (2) a summary of all stakeholder consultation activities undertaken since the April 25, 2002, scoping meetings, including any meeting minutes. The letter also indicated that a copy of the response shall be provided to each member of the Lassen Lodge stakeholder group. FERC rescinded the authorization to use the ALP on March 22, 2007, based on the response from Rugraw and letters submitted to FERC by several resource agencies.

Activities on the project began to pick up in 2007, and Rugraw conducted a conference call with FERC and several resource agencies on April 27, 2007, to discuss a process and schedule for moving forward with the license application. This call was followed by a letter to FERC dated May 11, 2007, that set forth specific tasks and proposed completion dates. Another call was conducted with FERC and agencies on August 21, 2007, to review progress and the proposed tasks and schedule (meeting notes in Exhibit K). A stakeholder/agency meeting (Appendix K) and project site visit were conducted on November 20, 2007. Meeting notes are available in Appendix K and contain the latest information of study plan progress and license application activities. Progress on the studies and license application continued until Rugraw submitted a draft exemption application on May 25, 2012 (see additional details below).
2.1.2 Preliminary Permits

Section 4(f) of the Federal Power Act authorizes the FERC to issue preliminary permits for the purpose of enabling prospective applicants for a hydropower license to secure the data and perform the acts required by section 9 of the Federal Power Act, which in turn sets forth the material that must accompany an application for license. The purpose of a preliminary permit is to preserve the right of the permit holder to have the first priority in applying for a license for the project that is being studied. Because a permit is issued only to allow the permit holder to investigate the feasibility of a project while the permittee conducts investigations and secures necessary data to determine the feasibility of the proposed project and to prepare a license application, it grants no land-disturbing or other property rights. The permit is issued for a period of 3 years.

Since 2001, the FERC has issued Rugraw multiple preliminary permits to study the project. Those include:

- June 26, 2001 (Project No. 11894-000)
- October 8, 2004 (Project No. 12496-000)
- May 4, 2010 (Project No. 12496-001)

The permit issued in May of 2010 expired in May of 2013. Since Rugraw had exclusive land rights to the site, no other project could use the site, and a Preliminary Permit is not required, Rugraw has continued developing the final license application without a preliminary permit.

2.1.3 Alternative Licensing Process

On October 19, 2001, Rugraw filed a request to use the ALP and that request was approved by FERC on December 13, 2001 (letter in Appendix K). In late 2004, FERC records indicated that progress toward developing a license application had slowed down and ultimately halted. Because the ALP requires active and ongoing consultation with agencies and stakeholders, FERC decided to rescind the authorization to use ALP. In a letter dated March 22, 2007 (Appendix K), FERC rescinded the APL process and indicated that Rugraw could proceed with development of a license application using the Traditional Licensing Process (TLP). The consultation process has proceeded to date using the TLP.

2.1.4 License Application Activities 2012 to Present

On May 25, 2012, Rugraw submitted a draft exemption application for the proposed Lassen Lodge Project to stakeholders and FERC staff. In a letter dated August 8, 2012, FERC indicated that the Project did not qualify for an exemption and further indicated that when Rugraw filed the final application, they must apply for a major water power project 5 MW or less, pursuant to
section 4.60 of the FERC regulations. Although FERC denied the exemption application, the staff continued in the letter to provide comments on the content of the document. In addition, comments were received from the SWRCB, CDF&G, and NMFS. Follow-up contact with FERC did clarify that although an exemption from licensing was denied, FERC considered the exemption application as a draft license application. As such, completion and submittal of the exemption application constituted completion of the second stage of consultation. Preparation and submittal of a final license application following the FERC requirements noted above would constitute completion of the third stage of consultation.

During this time period, in addition to the exemption application, Rugraw submitted a Use Permit Application to the County of Tehama. The permit is required by the county for any capital development project. In a letter dated August 22, 2012 (Appendix K) the county indicated receipt of the permit application and further indicated it to be incomplete. Additional information requests were detailed in the letter. Rugraw has been working since then to prepare the specific information requested by the county and provide that as a supplement to the original permit application. In addition to the information requests, the county also indicated an interest in becoming the lead agency for the CEQA process. This information was provided to the SWRCB during one of the informal consultation contacts. The SWRCB decided that they should take lead agency status for CEQA and prepared a letter (Appendix K) dated January 11, 2013, to the county indicating their position and justification for lead agency. Based on this letter and ongoing communication with SWRCB, it is our understanding that the SWRCB will be the lead agency for CEQA.

In September 2012, Rugraw contracted Tetra Tech to assist with preparation and submittal of the final license application. The exemption application and agency comment letters were reviewed and agency/tribal consultation restarted. Informal meetings, phone conversations, and emails were conducted to review current status of project information previously collected and documented. The agency interactions included USFWS, CDFW, NMFS, SWRCB, and USACE (Appendix K).

In the spring of 2013, agency consultation continued regarding upcoming proposed field studies for wetlands, botanical, wildlife, threatened and endangered species, fisheries, cultural resources, and water quality. These studies were planned to supplement previous studies and/or conduct new original studies. The cultural resource consultation documentation is detailed in the Cultural Resources Inventory, which is located in Appendix I of this Exhibit. Proposed study activities were provided to the agencies by email and then followed up by conference calls to review the proposals and get concurrence on the approach. On May 15, 2013, a conference call was conducted with USFWS, CDFW, and USACE. This call was followed by
conference notes documenting the discussions and agreements and submitted to the agencies on May 17, 2013 (Appendix K).

In order to have the proper authority to conduct consultation for endangered species and cultural resources, Rugraw submitted a letter (Appendix K) to FERC on May 3, 2013, requesting the following authorization: that the FERC designate Rugraw as the Commission’s non-federal representative for purposes of consultation under section 7 of the Endangered Species Act and the joint agency regulations thereunder at 50 CFR part 402, Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and the implementing regulations at 50 CFR 600.920. In addition, Rugraw requested authorization to initiate consultation under section 106 of the National Historic Preservation Act and the implementing regulations at 36 CFR 800.2(c)(4). In a letter dated May 8, 2013 (Appendix K), the FERC granted Rugraw the requested authorizations.

On June 14, 2013, Rugraw conducted a site visit at the Project site. The purpose of the site visit was to refresh or introduce the agency representatives on the locations of proposed project features. Attendees included representatives from Rugraw, Tetra Tech, NMFS, and CDFW. Site locations visited include the Panther Grade falls, location of the proposed powerhouse, Angel Falls, and location of the proposed diversion/intake. The trip was primarily informational for obtaining the context of site features. In addition, representatives from Rugraw and Tetra Tech attended a meeting of the Battle Creek Watershed Working Group on September 17, 2013, at the Lassen Volcanic National Park: Kohm Yah-mah-nee Visitor Center. The purpose of attending this meeting was to provide a brief presentation about the Project to members of the Working Group and solicit any additional information requests they may have. Meeting notes were prepared by the Working Group and provided to Rugraw for documentation purposes (Appendix K).

On July 3 and 4, 2013, representatives of Tetra Tech conducted a fisheries habitat assessment study on the SF Battle Creek reaches that would be affected by the proposed Project. In order to effectively consult with the fisheries agencies (CDFW and NMFS) it was decided to conduct an informational workshop on the assessment procedures. A meeting was conducted at NMFS Central Valley office in Sacramento on September 19, 2013. Participants included NMFS, CDFW, SWRCB, and Tetra Tech. Meeting minutes were prepared and are provided in Appendix K.

On October 1, 2013, a conference call was conducted to discuss the results of wildlife, botany, and wetlands 2013 field surveys. Participants included Rugraw, Tetra Tech and CDFW. Comments were received from CDFW and addressed. A similar conference call was conducted with USFWS representatives on November 27, 2013. Notes from the calls are provided in Appendix K.
In an email dated April 16, 2013 (Appendix K), the USACE indicated that they would need to read any biological assessments and archeological reports and concur with their findings before any consultations are initiated for NEPA. In order to comply with this request, the USACE was provided with copies of the final Botanical, Wetlands, and Cultural Resources Inventory (confidential version) reports for review and approval. The transmittal emails for these reports are dated November 7, 2013, and are available in Appendix K. To date, no response has been received from the USACE.

The information provided above documents the consultation process required as part of a License Application submittal. Informal agency consultation has continued up to the present and Rugraw expects to complete preparation and submit a Final License Application in April 2014.

3. REFERENCES


--------. 2013b. Cal Weed Mapper. Available at: http://calweedmapper.calflora.org/


CDFA (California Department of Food and Agriculture). 2013. Encycloweedia. Available at: http://www.cdfa.ca.gov/plant/ipc/weedinfo/winfo_list-synonyms.htm


———. 2012b. Personal communication on October 10, between Douglas Parkinson, Principal Biologist, Douglas Parkinson and Associates, Arcata, CA, and A. Peace, Senior Biologist, Tetra Tech, Inc., Bothell, WA.


Garza, J.C., and D.E. Pearse. 2010. Population genetic structure of *Oncorhynchus mykiss* in the California Central Valley. University of California, Santa Cruz and NOAA Southwest Fish Science Center, Contract report to California Department of Fish and Game.


—–. 1994. Ishi’s Ancestors. Manuscript on file Department of Anthropology, California State University Sacramento.


Lewis Publishing Company. 1891. *A Memorial and Biographical History of Northern California, Illustrated*. Containing a history of this important section of the Pacific coast from the earliest period of its occupancy...and biographical mention of many of its most eminent pioneers and also of prominent citizens of today.

Luning, W.F. 1903. Official Map of the County of Tehama, California carefully compiled from actual surveys by W.F. Luning, County Surveyor. Available online: http://cricket.csuchico.edu/scripts/PortWeb.dll?query&field1=Filename&op1=starts+with &value1=CA_2497.JPG&template=mapsSIDsearch&catalog=catMaps


McCubbins, Tom. 2010. WUI and Watershed Protection/Emergency Access Assessment (Coleman Fish Hatchery Road and Ponderosa Way). Tehama County Resource


Lassen Lodge Hydroelectric Project


