Vegetation and Invasive Weed Management Plan

Hydro License Implementation • Revised July 2022

Upper American River Project

FERC Project No. 2101

Powering forward. Together.

SMUD®

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Acronyms and Abbreviations

Acronym	Definition
ae	Acid Equivalent
ai	Acid Ingredient
AMZ	Aquatic Management Zone
ANSI	American National Standards Institute
ATV	All-Terrain Vehicle
BA/BE	Biological Assessment/Evaluation
BEE	Butoxy-Ethyl-Ester
BLM	Bureau Of Land Management
BMP	Best Management Practice
Cal DPR	California Department Of Pesticide Regulation
Cal Fire	California Department Of Forestry And Fire Protection
CDFA	California Department Of Food And Agriculture
CDFW	California Department Of Fish And Wildlife
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
COC	Chain Of Custody
CPUC	California Public Utilities Commission
dbh	Diameter Breast Height
DPR	Department Of Pesticide Regulation
DSO	Distribution System Operations
DSOD	Division Of Safety Of Dams
ELAP	Environmental Laboratory Accreditation Program
ENF	Eldorado National Forest
FAC	Facilities Design, Connections, And Maintenance
FDA	Food And Drug Administration
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
GIS	Geographic Information System
G.O.	General Order
GPS	Global Positioning System
HPMP	Historic Properties Management Plan

Acronym	Definition
HQ	Hazard Quotient
IPM	Integrated Pest Management
IROL	Interconnection Reliability Operating Limits
ISA	International Society of Arboriculture
IVM	Integrated Vegetation Management
kV	Kilovolt
MOS	Margin Of Safety
MOU	Memorandum Of Understanding
MSDS	Material Safety Data Sheets
MVCD	Minimum Vegetation Clearance Distance
NAD	North American Datum
NAS	National Academy Of Sciences
NRCS	Natural Resource Conservation Service
NERC	North American Electric Reliability Corporation
NOAA	National Atmospheric And Oceanic Administration
NOAEL	No Observed Adverse Effect Level
O&M	Operation And Maintenance
OHV	Off-Highway Vehicle
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety And Health Administration
PAC	Protected Activity Center
PAL	Protected Activity Level
PCA	Pest Control Advisor
PCO	Pest Control Operator
PCR	Pest Control Recommendation
POEA	Polyethoxylated Tallow Amine
PPE	Personal Protective Equipment
PSO	Power System Operations
PUP	Pesticide Use Proposal
QAC	Qualified Applicator's Certificate
QAL	Qualified Applicator's License
QA/QC	Quality Assurance/Quality Control
RC&C	Reliability Compliance & Coordination

Acronym	Definition
RCA	Riparian Conservation Area
RfD	Daily Reference Dose
ROW	Right-Of-Way
SERA	Syracuse Environmental Research Associates, Inc.
SMUD	Sacramento Municipal Utility District
SNFPA-RCO	Sierra Nevada Forest Plan Amendment-Riparian Conservation Objective
SPI	Spray Pattern Indicators
spp	Species
SWRCB	State Water Resources Control Board
T&D	Transmission And Distribution
TES	Threatened, Endangered, Sensitive
TCP	Tricyclopyr
TEA	Triethylamine Salt
TRAQ	Tree Risk Assessment Qualification
T-ROW	Transmission- Right of Way
TVMP	Transmission Vegetation Management Procedures
TWG	Technical Working Group
UARP	Upper American River Hydroelectric Project
UCCE	University of California Cooperative Extension
UF	Uncertainty Factor
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Society
UTM	Universal Transverse Mercator Coordinate System
VELB	Valley Elderberry Longhorn Beetle
VIWMP	Vegetation and Invasive Weed Management Plan
WECC	Western Electricity Coordinating Council
WQ	Water Quality
WQC	Water Quality Control

Glossary

Term	Definition
Adaptive Management	Sensitive resource protection priorities and strategies are expected to change over the term of the license based on climate conditions, listing/decline or delisting/recovery of individual species, and the potential discovery of new resources within the UARP boundary. Consequently, sensitive resource protection will be part of the yearly discussion with stakeholders during the annual review period. Protection strategies will be updated based on stakeholder recommendations agreed upon by the group and implemented by SMUD, as appropriate and feasible.
Aquatic	Growing or living in or frequenting water; taking place in or on water.
Aquatic Ecosystem	A stream channel, lake, or estuary bed, the water itself, and the biotic (living) communities that occur therein.
Best Management Practices (BMPs)	Per the National Core BMPs (in addition to the Region 5 BMPs), Best Management Practices (BMPs) for water quality are defined as: "Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters."
The Border Zone	A component of the right-of-way, the border zone is the section of the transmission ROW that extends from the wire zone to the ROW edge. The border zone is managed to promote a low growing plant community of forbs, taller shrubs, and low-growing trees.
Buffer	Used in the context of GIS; a buffer is a zone of a specified distance around a feature in a coverage.
California Wildlife Habitat Relationships	A system of classifying vegetation in relation to its function as wildlife habitat. Tree-dominated habitat is classified according to tree size and canopy closure.
Coverage	A digital map or layer of data in the ARC/INFO software program.
The Danger Zone	A component of the right-of-way, the danger tree zone is located beyond the border zone and is managed to eliminate trees that could fall and cause an outage (i.e., hazard trees).
Forest Road or Trail	A road or trail wholly or partly within or adjacent to and serving the National Forest system that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources (36 CFR 212).
Fuels	Plants and woody vegetation, living and dead that are capable of burning.
Forest Service Species of Conservation Concern	Plant or animal species which are susceptible to habitat changes or impacts from management activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the US. Fish

Term	Definition
	and Wildlife Service.
Fuels Management	The planned manipulation and/or reduction of living and dead forest fuels for forest management and other land use objectives.
Fuels Treatment	The treatment of fuels that left untreated would otherwise interfere with effective fire management or control. For example, prescribed fire can reduce the amount of fuels that accumulate on the forest floor.
Geographic Information Systems (GIS)	A computer system capable of storing, manipulating, analyzing, and displaying geographic information.
Groundcover	Natural organic and inorganic material that covers the watershed ground surface in sufficient quantity to allow a satisfactory rate of water infiltration to replenish ground water and limit erosion to natural rates. Groundcover usually consists of perennial vegetation, forest floor litter and duff, rock, downed wood, or similar erosion resistant material. Sufficient groundcover is usually 50 percent or greater, and cover of many forested ground surface areas is 80 percent or higher.
Habitat	The area where a plant or animal lives and grows under natural conditions.
Hand Piling	Piling by hand branches and limbs from tree harvests or thinnings by hand, for burning at a later time.
Hazard Tree	A standing tree with structural defects that presents a hazard to people, property or facilities, due to conditions such as deterioration of or damage to the root system, trunk, stem, or limbs or the direction or lean of the tree.
Hazard tree abatement	Hazard tree abatement includes trimming, topping the tree to a safe distance, or complete removal.
Herbicide	A substance that is toxic to plants and is used to destroy unwanted vegetation.
High Clearance Vehicle	All sport utility vehicles (SUVs), light trucks, motorcycles, and other highway-legal vehicles designed for operation on rough terrain. These vehicles are also OHVs.
In-slope	The water side of a canal.
Integrated Vegetation Management (IVM)	A programmatic, adaptive, strategy for the management of undesirable vegetation.
Intermittent Stream	A stream that flows during the wet season due to precipitation runoff and has streamflow extending partially through the dry season due to at least some groundwater contribution.
Invasive Plant	A subset of invasive plant species that are designated by the federal or state government as actionable and require management.
Limited Operating	A specified period of time during which certain land management activities

Term	Definition
Period	are prohibited.
Mastication	Shredding of brush skeletons and small dead trees (generally under 10 inches dbh).
Mitigation	Avoiding an impact by not taking a certain action or parts of an action. Minimizing impacts by limiting the degree or magnitude of the action. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
Monitoring	The repeated measurement of activities and conditions over time.
National Forest System	As defined in the Forest Rangeland Renewable Resources Planning Act, the "National Forest System" includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands, and land utilization projects administered under Title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (36 CFR 212).
National Forest System Road	A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
National Forest System Trail	A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
Natural Resource	A feature of the natural environment that is of value in serving human needs.
Noxious Weeds	Refer to Invasive Plant.
Perennial Stream	A stream that typically has running water on a year-round basis due to precipitation runoff in the wet season and continual contribution of groundwater to support streamflow throughout the dry season except in smaller streams during droughts.
Personal protective equipment (PPE)	Protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.
Pre-emergent Applications	Herbicide applications, applied to the soil prior to the emergence of seedlings or following germination. These herbicides have the ability to prevent germination of undesirable vegetation or control undesirable vegetation during early growth. Depending on the specific herbicide chemistry, these applications can provide selective or non-selective control.
Protected Activity	Designated areas that are afforded protection to specific species by

Term	Definition
Centers (PACs)	restricting certain management activities. For example, California spotted owl PACs protect owl habitat and breeding areas by restricting timber harvest.
Qualitative survey	A qualitative survey is completed during each monitoring visit annually to a revegetation site, and consists of a pedestrian visit to characterize cover, distribution, and density of plant species.
Resource Protection	A strategy for the protection of natural resources.
Riparian Area	The area along a watercourse, around a lake or pond, or in other wetlands.
Riparian Conservation Area (RCA)	RCAs are land allocations that have an associated set of desired conditions, management intents, and management objectives. RCA widths are specifically defined for certain stream types and aquatic features within the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA). RCA widths may be adjusted at the project level if a landscape level analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.
Riparian Ecosystem	The ecosystem around or next to water or in wetlands that support unique vegetation and animal communities as a result of a high water table.
Road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212).
Sensitive Species	Plant or animal species which are susceptible to habitat changes or impacts from management activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the US. Fish and Wildlife Service.
Slash	Tree tops and branches left on the ground after logging or accumulating as a result of natural processes.
Snag	A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.
Spatial Data	A GIS contains spatial data. The spatial data represents geographic features associated with real-world locations.
Special Aquatic Features	Lakes, ponds, vernal pools, meadows, bogs, fens, springs, and other wetlands.
Special-Status Plant Species	Plant species considered rare or of limited distribution that have been put on one or more of the following lists: Federal ESA, ENF or BLM Sensitive or Watchlist, Forest Service Species of Conservation Concern, or CNPS inventory of rare and endangered plants.
Species	A class of individuals having common attributes and designated by a common name; a category of biological classification ranking immediately below the genus or subgenus; comprising related organisms or populations potentially capable of interbreeding.

Term	Definition
Spray Adjuvants	Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions and Best Management Practices.
Suitability	The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.
Syracuse Environmental Research Associates, Inc. (SERA)	Worksheets by which the herbicides proposed in this VIWMP have been prepared were designed by SERA. The SERA worksheets were also used to inform the Biological Assessment/Evaluations (BA/BEs) that have been prepared to analyze the potential impacts to biological resources as a result of implementing this VIWMP.
Threatened Species	Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the US Fish and Wildlife Service under the Endangered Species Act of 1973.
Threshold of Concern	The level of watershed disturbance which, if exceeded, could create adverse watershed or water quality effects, in spite of application of best management practices and project design criteria.
Watchlist Plant	A species of plant of limited distribution, of public concern, locally uncommon, recently described, or occurs as disjunct populations, as determined by the local National Forest or BLM region. These plants are not afforded the same protection as USFS/BLM Sensitive Plants but populations will be recorded during surveys.
Water Quality Objectives	Water quality objectives, as listed in the Basin Plan of the California Central Valley Regional Water Quality Control Board, are the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water.
Watershed	An area of land above a given point on a stream that contributes water to the streamflow at that point.
Wetlands	Areas that are inundated by surface or ground water with a frequency sufficient to support (and that under normal circumstances do or would support) a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.
The Wire Zone	A component of the right-of-way, the wire zone includes the section of a transmission ROW directly under the wires and extending outward about ten feet on each side. The wire zone is typically managed to sustain a community of grasses, forbs, and low-growing shrubs.

1.0 INTRODUCTION

The Federal Energy Regulatory Commission (FERC) issued a license to the Sacramento Municipal Utility District (SMUD) to operate and maintain the Upper American River Hydroelectric Project (UARP; FERC Project No. 2101) in 2014. The UARP consists of seven developments located on the Rubicon River, Silver Creek, and South Fork of the American River in El Dorado and Sacramento Counties throughout the Sierra Nevada foothills in California (Figure 1). The UARP boundary encloses a total of 10,253 acres of lands that support project generation-related features, including transmission lines, access roads, and hydroelectric facilities. Much of the UARP occupies federally owned lands administered by the U.S. Department of Agriculture, U.S. Forest Service (USFS) and U.S. Department of Interior, Bureau of Land Management (BLM). In addition, the UARP boundary includes numerous recreation-related facilities that are maintained by the USFS with funding from SMUD. SMUD is required to operate and maintain the UARP in accordance with the terms of the FERC license (FERC 2101).

SMUD has prepared this Vegetation and Invasive Weed Management Plan (VIWMP) in consultation with appropriate county, state, and federal regulatory agencies in order to satisfy State Water Resources Control Board (SWRCB), 401 Water Quality Certificate Condition 26, and USFS 4(e) Conditions 39 and 59. Condition 26 specifies that the plan address both aquatic and terrestrial weeds and implementation of United States Fish and Wildlife Service (USFWS) Valley Elderberry Longhorn Beetle conservation guidelines. Condition 39 specifies that the plan address control, inventory, and monitoring of invasive weeds, and restore/revegetate areas where treatment has eliminated invasive weeds in an effort to reduce reintroduction. Condition 59 specifies that the plan address vegetation management under existing project-associated distribution and transmission lines and revegetation/rehabilitation of inadequately vegetated areas. These conditions are described in more detail in Table 1. Figures 1 and 2, provide the location of SMUD facilities and general survey areas for sensitive plants that will be surveyed at 5-year intervals (Figure 2 is for 2021 surveys) . Results will be reported at the annual meeting with the USFS and BLM (Section 3.1).

1.1 PURPOSE

The primary purpose of the VIWMP is to establish procedures and protocols for management of native vegetation and treatment of invasive weeds in order to maintain a desirable environmental condition that is consistent with the safe and effective operation and maintenance (O&M) of UARP features. In addition, this VIWMP applies to access roads that SMUD is responsible for managing that are outside the UARP boundary. This VIWMP contains descriptions of specific vegetation management actions, including treatment of invasive weeds, which SMUD will use to achieve desired conditions in and around project-related transmission corridors, facilities, and access roads. The vegetation management strategies outlined in this VIWMP describe how SMUD will achieve a variety of desired conditions, dependent on the type of site, from bare ground (powerhouses and switchyards) to compatible native vegetation communities (transmission corridors).

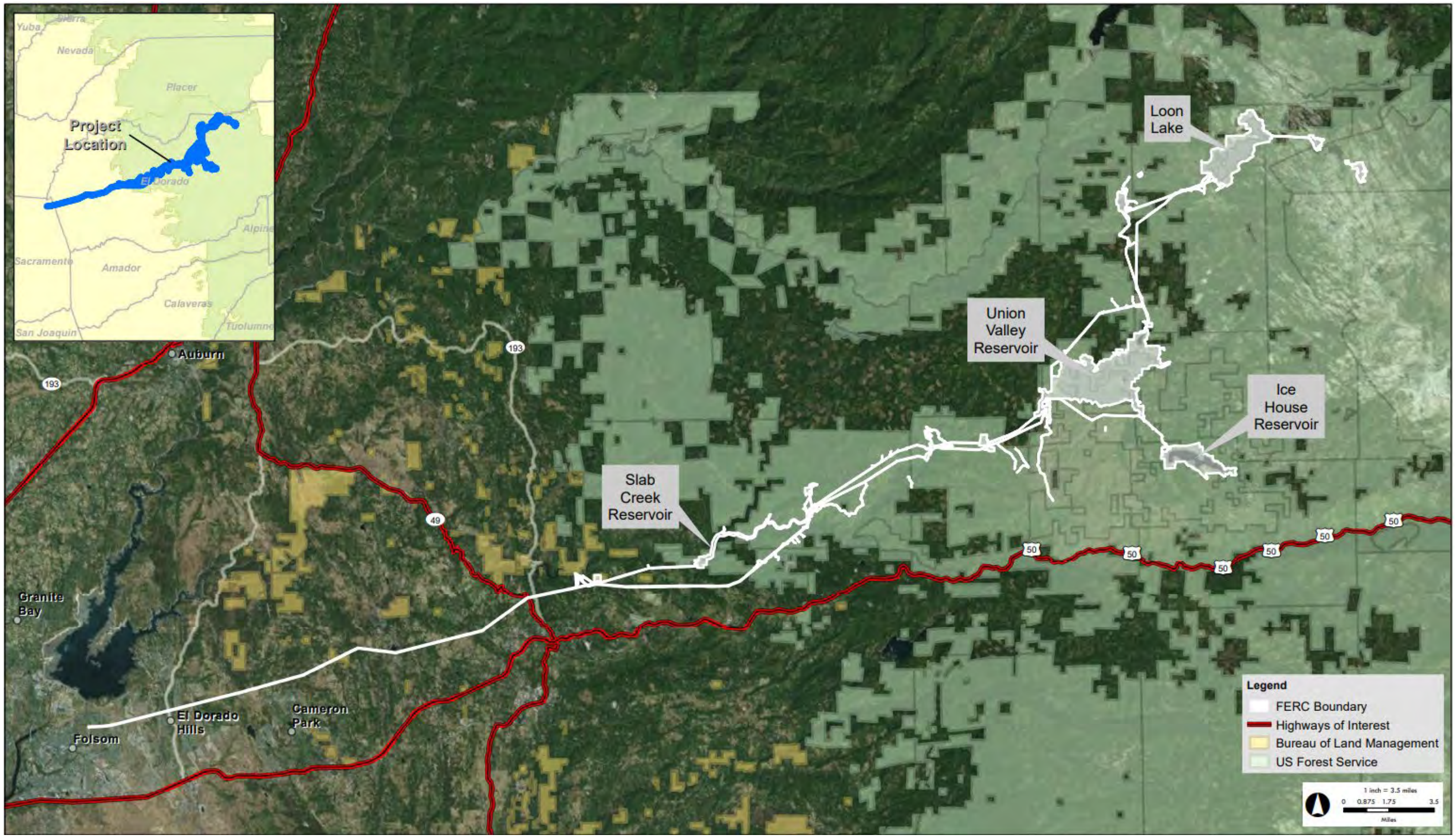


Figure 1 Project Boundary

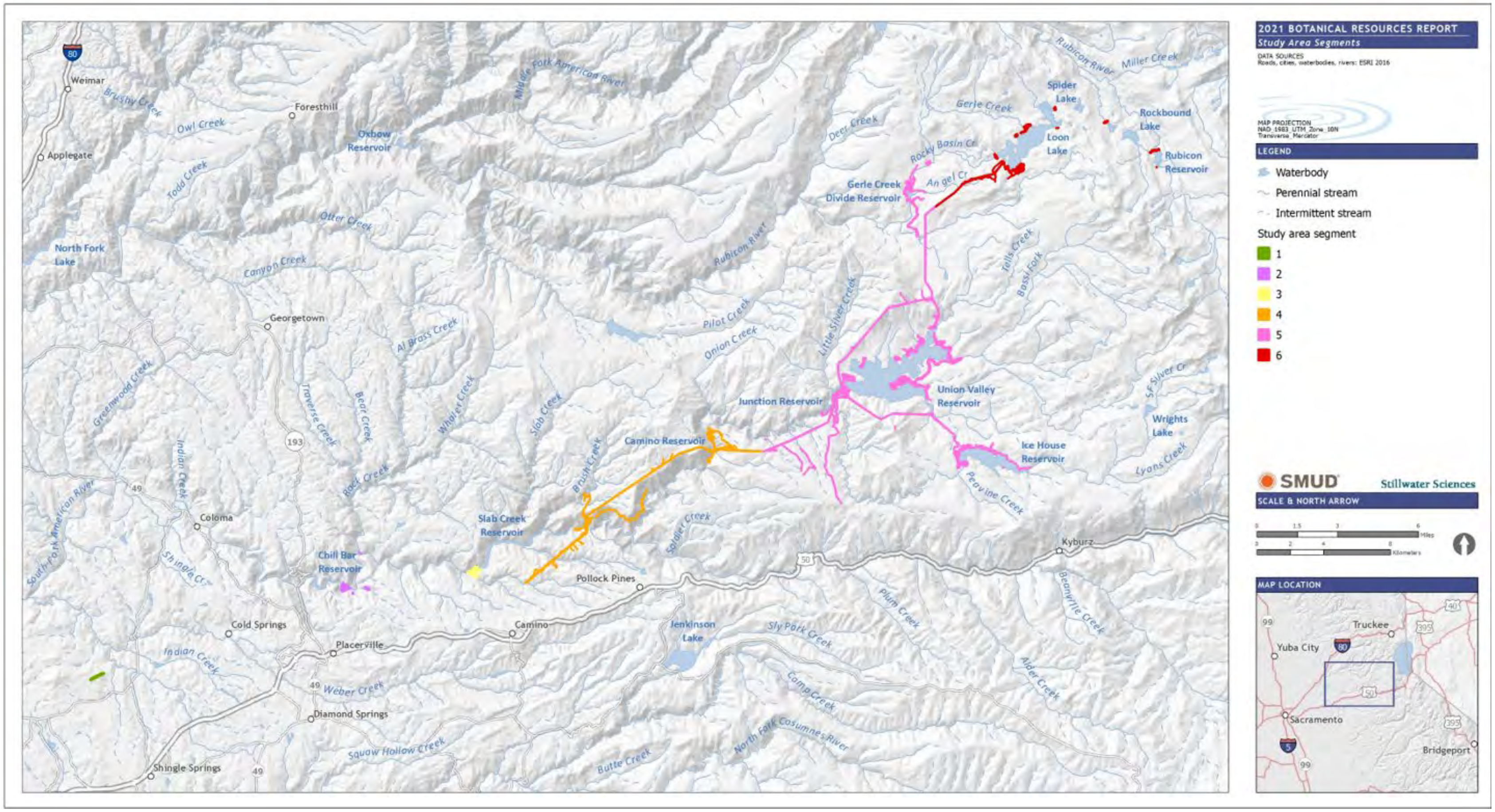


Figure 2 Botanical Survey Areas

Table 1. FERC License Conditions Applicable to the VIWMP in the UARP

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
USFS 4(e) Condition 39. Vegetation and Invasive Weed Management Plan	Within 2 years of license issuance, the licensee shall file with FERC an Invasive Weed Management Plan developed in consultation with Forest Service, USFWS, the appropriate County Agricultural Commissioner, and California Department of Food and Agriculture. Invasive weeds will be those weeds defined in the California Food and Agriculture code, and other species identified by Forest Service. The plan will address both aquatic and terrestrial weeds within the project boundary and adjacent to project features directly affecting National Forest System lands including, roads, and distribution and transmission lines. The Invasive Weed Plan will include and address the following elements: Inventory and mapping of new populations of invasive weeds using a Forest Service compatible database and GIS software. The invasive weed GIS data layer will be updated periodically and shared with resource agencies. Action and/or strategies to prevent and control spread of known populations or introductions of new populations, such as vehicle/equipment wash stations. Invasive plants presently identified include the following: *Aegilops triuncialis, Carduus pycnocephalus, Centaurea solstitialis, Chondrilla juncea, Cytisus scoparius, Genistia monspessulana, Lythrum salicaria, Bromus tectorum, Bromus diandrus*, and *Taeniatherum caput-medusae*. Where these populations are (1) contiguous and extend outside the Project boundary or (2) downstream of populations inside the project boundary and have a reasonable nexus to the project, the licensee shall make reasonable efforts to control the entire population unit. Development of a schedule for control of all known A, B, Q, and selected other rated invasive weed species, designated by resource agencies. On-going annual monitoring of known populations of invasive weeds for the life of the license in locations tied to project actions or effects, such as road maintenance, at project	See Introduction, Section 1.3. This VIWMP is developed in consultation with the appropriate regulatory agencies. Definition of Invasive Weeds in Section 2. Discussion of aquatic weeds in Section 3.5. Vegetation survey protocols are discussed in Section 3.4.1. Actions to protect resources and control the spread of Invasive plant populations are discussed in Section 2.1. and Section 5. A general schedule is included as Section 2. This is also based on the treatment category of a specific species, which is discussed in Section 2. Monitoring and maintenance activities are discussed in Sections 3.2.

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
	facilities, O&M activities, new construction sites, etc. to evaluate the effectiveness of revegetation and invasive weed control measures.	
	The plan will include an adaptive management element to implement methods for prevention of aquatic invasive weeds, as appropriate. These actions may include but may not be limited to (1) public education and signing of public boat access, (2) preparation of an Aquatic Plant Management Plan approved by Forest Service, and in consultation with other agencies, and (3) boat cleaning stations at boat ramps for the removal of aquatic Invasive weeds.	Aquatic weeds are discussed in Section 3.5.
	New infestations of A& B rated weeds shall be controlled within 12 months of detection or as soon as is practical and feasible (A, B, C, & Q ratings refer to the California Department of Food & Agriculture Action Oriented Pest Rating System). At specific sites where other objectives need to be met, all classes of invasive weeds may be required to be treated.	New infestations will be discussed during the annual review period and treated using the most appropriate methods and timing described in Sections 5.
	Monitoring will be done in conjunction with other project maintenance and resource surveys, so as not to require separate travel and personnel. Monitoring information, in database and GIS formats, will be provided to Forest Service as part of the annual consultation on affected Forest Service resources (Condition No 40).	Monitoring and maintenance activities are discussed in Section 3.2.
	To assist with this monitoring requirement, the Forest Service will provide training in invasive plant identification to project employees and contractors.	Annual employee training is discussed in Section 5.0.
	Licensee shall restore/revegetate areas where treatment has eliminated invasive weeds in an effort to eliminate the reintroduction of invasive weed species. Project-induced ground disturbing activities shall be monitored annually for the first 3 years after disturbance to detect and map new populations of invasive weeds.	Revegetation of disturbed sites is discussed in Section 4.
	The Vegetation Plan will include and/or address the following elements: Hazard tree removal and trimming. Powerline/transmission line clearing.	A discussion regarding hazard trees is included in Section 2.4 Transmission is discussed in Section 2.4

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
	Vegetation management for habitat improvement. Revegetation of disturbed sites. Soil protection and erosion control, including use of certified weed-free straw. Establishment of and/or revegetation with culturally important plant populations. Use of clean, weed-free seed, with a preference for locally collected seed. The licensee shall comply with the Eldorado National Forest prescriptions for seed, mulch, and fertilizer for restoration or erosion control purposes. Upon FERC approval, the licensee shall implement the plan.	Habitat improvement is discussed in Section 4. Revegetation is discussed in Section 4. Erosion control relates to the water quality discussion in Section 5. Cultural resources are considered in Section 5. Seed mixes are discussed in Section 5. SMUD revegetation will coincide with Forest Service prescriptions, as discussed in Section 5.
USFS 4(e) Condition 59. Vegetation Management Plan	The licensee shall file a Vegetation Management Plan that is approved by Forest Service, USFWS, and CDFW with FERC, within 2 years of license issuance or prior to any ground-disturbing activities. Address vegetation management under existing project-associated distribution and transmission lines on National Forest System lands. At a minimum, the plan shall include the following: 1. Identify and prioritize (into high, moderate, and low priority sites) all inadequately vegetated areas to be revegetated or rehabilitated along with an implementation schedule. 2. List the plant species to be used along with planting locations, methods, and densities (emphasis shall be given to use of native plant species, especially those with cultural importance). Emphasis shall also be given to using seed from certified weed-free sources and using seed from local sources, as these materials are available.	This VIWMP is intended to fulfill this requirement. Revegetation is discussed in Section 4. Revegetation methods are discussed in Section 4.2.
BLM 4(e) 4-13 Pesticide Use Restrictions	4-7 Compliance with Regulation on Bureau of Land Management Land and 4-13 Pesticide Use Restrictions in the consultation process and provisions similar to the ones described for the USFS, regarding inventory, mapping, strategies to prevent and control weeds, etc.	Annual approval described in Section 3.1.

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
SWRCB 401 WQC Condition 26. Vegetation and Invasive Weed Management Plan	Within 2 years of license issuance, the Licensee shall prepare a Vegetation and Invasive Weed Management Plan (Vegetation Plan) in consultation with Forest Service, USFWS, the appropriate County Agricultural Commissioner, and the California Department of Food and Agriculture. Invasive weeds will be those weeds defined in the California Food and Agriculture code and other species identified by Forest Service. The Vegetation Plan must address both aquatic and terrestrial weeds within the UARP boundary and adjacent to UARP features directly affecting National Forest System lands, including roads and distribution and transmission lines. The Vegetation Plan must include the implementation of the USFWS Valley Elderberry Longhorn Beetle Conservation Guidelines. The Licensee shall submit the Vegetation Plan to the Deputy Director for approval of those elements of the plan that deal with Valley Elderberry Longhorn Beetle conservation and aquatic invasive weeds prior to submitting the plan to the Commission. The Licensee shall provide the Deputy Director with any comments provided by the agencies during the consultation process. The Licensee shall provide the Deputy Director with at least 90 days to review and approve the Vegetation Plan prior to submittal to the Commission, if applicable. The Deputy Director may require modifications as part of the approval. The Licensee shall file the Deputy Director's approval, together with any required modifications, with the Commission. The portion of the Vegetation Plan for which approval by the Deputy Director is required must include an adaptive management element for prevention of aquatic invasive weeds. If Forest Service, the State Water Board, or the Licensee determines that aquatic invasive weeds are present in the UARP area, the Licensee shall prepare a subsequent plan or amendment to the Vegetation Plan that describes measures designed to address the infestation, as appropriate. These actions may include, but may not be limited to (1) public education and signage at public boat access locations; (2) preparation of an Aquatic Plant Management Plan, approved by the Deputy Director and developed in consultation with other agencies; and (3) boat cleaning stations at boat ramps for the removal of aquatic invasive weeds.	This VIWMP is intended to fulfill this requirement and was developed in coordination with the appropriate regulatory agencies. Valley elderberry longhorn beetle are discussed in Section 5. Aquatic weeds are considered in Section 3.5 Adaptive management for the overall plan is included in Section 5.

1.2 GOALS

There are a number of important goals that this VIWMP is designed to achieve. In some instances these goals may be at odds with each other and the parties must balance competing interests to achieve a mutually agreeable outcome. One goal that all parties agree is of paramount importance, and will therefore guide all decisions related to the management of vegetation in the UARP, is employee and public safety.

In addition to the primary goal of safety, the VIWMP is intended to meet the following, additional goals:

- Reduce Risk of Fire
- Resource Protection
- FERC License and Regulatory Compliance
- Effective and Efficient Control of Undesirable Vegetation

This plan would meet USFS Riparian Conservation Objectives (RCO) with the implementation of best management practices (BMPs) and resource protection measures. Water Quality BMPs (Table 4), watercourse buffers (Table 5), and resource protection measures (Table 6) would protect water quality, riparian and aquatic habitat, and the beneficial uses of water. Potential effects of the proposed action, either through surface runoff of sediment and chemicals or chemicals entering water bodies through groundwater sources do not constitute a significant degradation of quality or impair existing beneficial uses of water.

1.3 BACKGROUND

The UARP boundary encompasses a variety of habitats extending from about 380 to 6,540 feet (116 to 1,993 meters) elevation. A variety of documented biological resources including listed and sensitive plants, as well as invasive weeds, have been mapped within the boundary. Of approximately 10,253 total acres in the UARP, 6,284 acres are on Federal lands (53 acres BLM/ 6,231 acres USFS). Of the total area, approximately 1,017 acres are within the transmission right-of-way (ROW), which includes 299 acres on Federal land. There are also a number of roads that SMUD manages that are outside the FERC boundary where vegetation management activities would occur.

SMUD estimates that treatment of vegetation is required annually on approximately 115 acres surrounding facilities, 100-150 acres of transmission ROW, and 25-40 acres of roadside shoulder. Of these 304 gross acres, only about 150 acres actually need to be treated using herbicides because most sites use targeted applications (especially around facilities and under the transmission lines).

As stipulated in the license conditions, the VIWMP has been developed in consultation with the USFS, USFWS, BLM, the California Department of Fish and Wildlife (CDFW), the El Dorado County Agricultural Commissioner (County), and the California Department of Food and Agriculture (CDFA). Additional stakeholders invited to contribute to the development of the VIWMP include the University of California Cooperative Extension (UCCE) and the California Department of Forestry and Fire Protection (Cal Fire). Each agency was invited to participate in a Technical Working Group (TWG) hosted by SMUD that focused on the development of the VIWMP in addition to standard review and comment periods associated with UARP documents. SMUD acknowledges that vegetation management actions within the UARP should correlate with similar actions being undertaken by the various stakeholders. These collaborative efforts lend themselves to better and more efficient overall land management.

2.0 PROPOSED VEGETATION MANAGEMENT METHODS

This section includes methods, tools, and management goals that are incorporated into a comprehensive plan reflecting the needs and unique nature of the various UARP facility sites. SMUD will apply the widely-accepted concept of Integrated Vegetation Management (IVM), a programmatic, adaptive strategy for the management of undesirable vegetation. One objective of this IVM program is to establish compatible vegetation (and eliminate incompatible vegetation) near UARP facilities. Compatible vegetation is desirable or compatible with the intended use of the facility. An example of compatible vegetation in a transmission ROW are plant species that will never grow sufficiently close to violate minimum clearances with electric conductors, such as grasses, forbs, and low growing shrubs. Conversely, a 90% cover of a flammable brush, such as manzanita, averaging 4 to 6 feet tall, across the right-of-way would be incompatible, as it would limit access and present a significant risk to the conductors and other facilities in the event of fire. This same population of manzanita, but located in the canyon 200 feet below the transmission lines, would not be an issue or require vegetation management. Similarly, vegetation that encroaches on an access road and limits the lane width or line of sight is considered incompatible. For the safe and reliable operation of a hydroelectric dam, portions of the facility must be maintained to bare ground (vegetation free) in order to facilitate inspection and maintenance. Location, species, and ranking factor into control strategies for invasive plants and/or invasive weeds.

Treatment timing and methods will vary with each population and location. In general, compatible vegetation will not interfere with the safe and reliable transmission of electricity or the inspection and maintenance of facilities. Incompatible vegetation is undesirable or unsafe and may interfere with the intended use of the facility or ROW now or at any time in the natural lifespan of the plant species. Definitions of compatible and incompatible vary depending on facility, species, density, and management requirements for those facilities. This IVM program is adaptive, and the management techniques and strategies will vary by site, but all of the potential strategies and techniques that SMUD will employ are described in this VIWMP.

IVM relies on using a variety of management tools, with the trained vegetation manager selecting the most appropriate method to control vegetation, considering safety, efficiency, cost, and environmental impacts. Sections 2.1 and 2.2 describe the methods and materials SMUD intends to use to treat native vegetation and invasive weeds. Section 5 describes the Best Management Practices (BMPs) for all vegetation control techniques to reduce risks to workers, the public, and the environment.

2.1 INVASIVE WEED TREATMENTS

Invasive weeds are those defined in the California Food and Agriculture Code and other species identified by the Forest Service or BLM. The Forest Service regularly prepares a list of invasive weeds that includes four categories of management based on the species of weeds and their characteristics. Invasive weed infestations identified during the monitoring (described below in Section 3) will be targeted for treatment during annual facility vegetation management, according to the USFS and BLM management objectives for each invasive weed. Priorities for treatments will follow the management direction in the USFS/BLM lists, based on the type of weed, the location (i.e. leading edge, etc.) and size of the population. Treatments will be timed to occur when the weeds are most sensitive to treatment whenever possible, especially for infestations targeted for eradication. Invasive weeds will be treated with herbicides, as described below in Section 2.3, or mechanical/manual methods (Section 2.2) . SMUD will conduct invasive weed treatments within the project boundary where infestations can be linked to project-related activity.

2.2 MECHANICAL/MANUAL METHODS

Vegetation may be cleared using large mechanical equipment (mowers/masticators), small, gas-powered equipment (trimmers or chainsaws), or hand tools. Personal protective equipment (PPE) requirements applicable to the type of equipment shall be mandatory.

- Mechanical methods of removal are effective for clearing large areas and will be used when it is necessary to clear segments of transmission ROW or reestablish sites that are overgrown with significant amounts of vegetation. These methods will include utilizing mowers, high speed flails, or rotary disk saw blades mounted on an excavator body. Mechanical methods are constrained by watercourse protection buffers, slopes, USFS Protected Activity Levels (PALs) for fire danger, inclement weather, and sensitive species or habitats. The use of an "excavator body" to conduct mechanical treatment of vegetation within the Pine Hill Preserve ACEC lands must be approved by the BLM prior to commencing work.
- Trimmers: Herbaceous and some woody vegetation will be controlled using hand-held gas-powered string or brush blade trimmers. Advantages of trimmers include the ability to remove a wide range of vegetation types, growth, and density over relatively large areas quickly. This tool can be easily transported into locations and used across a wide variety of terrains and habitats, including near some sensitive sites. The potential for injury is a concern with trimmer use,

especially on roadways and the uneven, often steep, terrain along dams and canals. Long-term nerve damage is also a safety concern when using trimmers extensively. There are limits on size and volume of vegetation that can be effectively treated using trimmers. Using trimmers on invasive weeds after seed has set can scatter seeds and spread infestations.

- Chainsaws: Shrubs and trees that are greater than 2 inches in diameter will be removed using chainsaws. Chainsaws can be used in most locations, including riparian areas, and on numerous vegetation types and densities effectively and efficiently. The primary disadvantage of a chainsaw is the potential for injury. Acute physical harm can result from contact with the chain at any speed above idle. Hearing loss or chronic physical injury is possible from long-term use. Physical fatigue, heat exhaustion, and dehydration are also a concern. Furthermore, noise, air quality, and seasonal fire conditions can limit the use of chainsaws.
- Hand Tools: Small woody vegetation (less than 2 inches in diameter) can be removed using loppers, pruning saws, and other hand tools. The advantages of hand tools include specificity of treatment and the low impact nature of the treatment. This method can be used on all terrain, geography, and topography. Individual plants or branches can be removed without impact to surrounding vegetation. Requirements for transport and set-up of equipment are minimal, making them ideal for use in remote areas. Furthermore, PPE requirements are minimal, and the absence of fuel reduces the risk of spill, fire, and air quality impacts. Hand tools are also preferred in areas where noise might impact nesting birds or other wildlife. Disadvantages include worker fatigue, limits on the size and volume of vegetation to be managed, and increased time and costs. The application of hand tools will be minimal and targeted, primarily to control vegetation in very small areas.
- Hand Pulling: Small woody vegetation (less than 2 inches in diameter) and non-woody invasive plants can be removed by hand pulling. The advantages of hand tools include specificity of treatment and the low impact nature of the treatment. Disadvantages include worker fatigue, limits on the size and volume of vegetation to be managed, and increased time and costs. The application of hand pulling will be minimal and targeted, primarily to control vegetation in very small areas.

2.3 HERBICIDES

Several herbicides, each with unique attributes, are proposed for vegetation management within the UARP and are listed in Table 2. There are multiple methods of application possible depending on the formulation, mode of action, type of vegetation, and period of implementation (i.e., initial or follow-up treatment). The use of chemicals to control vegetation has several advantages, including:

- Greater efficiency and cost savings, since workers can often cover much more ground using herbicides compared to manual methods,
- Reduced worker fatigue depending on the method of application and reduced risk for injury compared to some mechanical methods,
- Can be applied more safely and effectively than trimmers on challenging terrain
- Targeted chemistry can be used to selectively treat unwanted vegetation while preserving other vegetation,
- Some species are very difficult to control without herbicide,
- Reduced disturbance to wildlife and habitats as a result of fewer entries into the site and less intrusive equipment (i.e., backpack sprayers versus tracked masticator/mower),
- Application is appropriate on most terrain and environments,
- Effective on most vegetation types, sizes, and densities with variable treatment (i.e., chemical and application) options,
- Longer lasting results compared to manual or mechanical methods.

The use of herbicides is not without risk. Detailed Human Health and Risk Assessments (found in Appendix A) using the Syracuse Environmental Research Associates, Inc. (SERA) worksheets for the herbicides proposed in this VIWMP have been prepared. The SERA worksheets were also used to inform the Biological Assessment/Evaluations (BA/BEs) that have been prepared to analyze the potential impacts to biological resources as a result of implementing this VIWMP. The BA/BE's, in turn, were used to develop the methods and Best Management Practices (BMPs) proposed in this plan. The following general risks are associated with herbicide applications:

- Acute or chronic toxicity to non-target species from drift or error in application,
- A spill of herbicide getting into a waterway or other sensitive site,
- Water contamination,
- Health risk to the public and workers applying chemicals from long-term exposure,
- Use of wrong amount or type of chemical, rendering the application unsuccessful and resulting in wasted effort and more cost,
- Negative public perception.

All herbicide applications require the following:

1. licensed and trained personnel;
2. annual safety and product training for each herbicide used;
3. use of PPE, including goggles, gloves, long pants, long-sleeved shirts, shoes, and socks, as well as any additional specific equipment specified on the product label;
4. Pest Control Recommendations (PCRs) written by a licensed Pest Control Advisor (PCA);
5. applications made by a licensed Pest Control Operator (PCO);

6. monthly reporting of each use of herbicide to the applicable County Agricultural Commissioner;
7. annual inspections by the County Agricultural Commissioner;
8. annual Pesticide Use Proposals (PUPs) for application of herbicide on lands owned by the Forest Service and BLM lands where it is appropriate to do so; and
9. annual use reporting use to the Forest Service and BLM (when applicable).

Because of resource concerns, no herbicides will be used within designated wilderness areas of the Forest.

2.3.1 Herbicide Application Methods in the UARP

Below is a description of the application methods to be prescribed within the UARP and the herbicides to be used.

2.3.1.1 Post-Emergent Applications

Post-emergent applications are made after the germination and emergence of target weeds or plant species and have the ability to provide adequate control of those species. The herbicides prescribed for post-emergent applications most often have a mode of action that includes foliar uptake. See Table 2 for explanation of which herbicides will be used for this purpose.

- Directed Foliar Backpack: This type of application involves individual workers wearing backpack application equipment and using a wand with a nozzle to target applications. Nozzles are engineered to produces coarse droplet (350 Microns or greater). Applications are directed to the vegetation since the applicator has very precise control over the location and amount of herbicide application.
- Broadcast Backpack: This technique involves spraying areas to treat vegetation. Applications are not directed at specific species but rather at an area. Depending on the herbicide and its intended use, these treatments can be used to remove all vegetation in order to achieve a bare ground condition. Alternatively, if applied using selective herbicides, they remove undesirable broadleaves or grasses to achieve desired conditions.
- Low boom (all-terrain cycle [ATV/UTV]) applications are another way to apply herbicide. Depending on the herbicide, these treatments can be selective or non-selective, pre or post-emergent. This method involves the use of spray equipment mounted to a vehicle. The boom sits less than 2 feet off the ground with 1 or more nozzles directed at the ground. The applicator controls an electric pump as the applicator drives at a set pace to apply a known quantity in a continuous swath. The primary use of this equipment will be in switch yards and along access roads where bare ground condition is required. This equipment is also used to support back pack applications.

- Basal stem treatments are individual plant treatments applied using backpack sprayers. This treatment is dependent on mode of action and formulation of the herbicide. The spray is applied to the lower 18 inches of the target woody plant stem and is most effective on stems that are less than 6 inches in diameter breast height (dbh) with juvenile bark. The herbicide is diluted in a seed oil carrier. The combination of herbicide and oil is able to penetrate the bark, providing the desired control. Basal stem applications generally have a longer application season (March through December) than other methods. Therefore, applications are frequently made during the dormant season, as deciduous plant stems are more accessible once the plants have lost their leaves. The greater accessibility typically means less over-spray during application. Dormant applications also often produce less of a visual impact because applications are made at a time when plants are without foliage, so brown-out is avoided, and the transition is gradual and less noticeable. With this application, herbicide volumes are minimal, and the application is precisely targeted.
- Cut-stump treatments are used to prevent woody species from resprouting. After trees and brush are cut with a chainsaw or loppers, the stump is treated with herbicide using a backpack or 2-gallon pressurized hand can. Most cut-stump treatments can be made year-round. There are several herbicides that can be applied using this method. With this application, herbicide volumes are minimal and the application is precisely targeted.
- Frill (or hack and squirt) is an application method in which a frill or “hack” is made into the woody cambium. Small amounts of undiluted herbicide are then applied to the frill using a squirt bottle, syringe, or similar device, such that the solution does not run out of the cut. The herbicide gradually translocates to the roots and stems. With this application, herbicide volumes are minimal, and the application is precisely targeted.
- Wicking (or wiping) is a plant specific, very selective method of herbicide application. Concentrated herbicide is applied directly to the upper foliage of target species using a wicking device or other piece of equipment that can brush herbicide onto the plant. Wicking devices can be mounted on the end of a backpack sprayer; there are standalone gravity feed wicking devices available as well. A very small amount of herbicide is required. A single plant can be removed from within a population via this method. It is intended for small-scale applications as it is very labor-intensive. Extreme caution must be used to avoid contact with the desirable vegetation. Using concentrated solution means any spill or droplet is very potent on any plant that it may come in contact with. This method is most effective with herbicides that are highly systemic, such as glyphosate or imazapyr.

2.3.1.2 Pre-Emergent Applications

Pre-emergent applications are herbicides applied to the soil prior to the emergence of seedlings following germination. Depending on the specific herbicide chemistry, these applications can provide selective or non-selective control.

Applications are made with backpacks or low boom spray equipment mounted on ATVs. Where vegetation management is desired, the application is made directly to the ground The benefits of pre-emergent herbicide include selectivity, increased efficacy, reduced number of applications, reduced amount of active ingredient per acre, and reduced costs compared with post-emergent herbicides or manual or mechanical methods.

Both Selective and Non-selective chemistry will be used in the UARP:

- **Non-selective pre-emergent herbicides** are generally used where bare ground conditions are required e.g., switch yards.
- **Selective pre-emergent herbicides** can be used to control undesirable broadleaf species while maintaining desirable grass species on areas such as a dam slope or along a penstock.

2.3.1.3 Spray Adjuvants

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions, and Best Management Practices. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species, as they are an important tool to mitigate potential adverse impacts to humans and natural resources. Dyes are not regulated as a pesticide and are not considered toxic to wildlife, plants, or humans (Bakke 2007). The surfactant helps the absorption of herbicide mixture into the plant. Surfactants will include 90% active non-ionic surfactant and a modified seed oil surfactant/diluent. These products are derived from food-grade vegetable oils. Additional information on the toxicity and risks associated with dyes and surfactants are located in the Risk Assessment and BAs for the VIWMP. The application rates for each of the herbicides and surfactants proposed for use will be in accordance with each material's label instructions.

Table 2 describes the proposed herbicides, application and rate, and accompanying adjuvant. Table 2 also displays the potential tank mixes used for various application methods, and the timing of various applications at various facilities.

Table 2. Herbicides, Application, and Adjuvants

Herbicide (active ingredient)	**Application Method****	**Application Type**	**Maximum Application Rate** (pound acid equivalent or active ingredient/acre)	**Optimal Timing**	**Primary Purpose**	**Adjuvants**
Amino-pyralid	Directed Foliar / Limited broadcast	Selective post-emergent with pre-emergent activity	0.11 a.e. lbs/acre	Late winter, fall	Broadleaf invasive plant control	Surfactant (Competitor) SPI(Hi-light Blue)
Chlor-sulfuron	Directed Foliar/selective pre-emergent, broadcast backpack, low boom in switchyards	Selective pre-emergent and tank mix with Sulfometuron for bare ground	0.05 ai lbs/acre	Late winter	Broadleaf selective/ bare ground	Surfactant (Competitor) SPI(Hi-light Blue)
Clopyralid	Directed Foliar	Selective Post-emergent	0.14 a.e. lbs/acre	Spring	Broadleaf invasive plant control	Surfactant (Competitor) SPI(Hi-light Blue)
Glyphosate (aquatic)	Directed Foliar/ Cut Stump(1)/frill/ wicking, low boom in switch yards	Post-emergent non-selective	2.0 a.e. lbs/acre	Later winter thru late fall	General vegetation management	Surfactant (Competitor) SPI(Hi-light Blue)
Imazapyr (aquatic)	Foliar/cut stump/frill/ wicking	Post-emergent non-selective	0.33 a.e. lbs/acre	Summer	Brush control	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)
Imazapyr (terrestrial)	Basal stem	Post-emergent non-selective	0.33 a.e. lbs/acre	Summer-fall	Brush control	Diluent (Competitor)
Sulfomet-uron Methyl	Broadcast Backpack pre-emergent , low boom in switch yards	Pre-emergent non-selective, tank mix for bare ground control	0.14 ai lbs/acre	Late winter	Grass Selective/bare ground	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)

Herbicide (active ingredient)	**Application Method****	**Application Type**	**Maximum Application Rate** (pound acid equivalent or active ingredient/acre)	**Optimal Timing**	**Primary Purpose**	**Adjuvants**
Triclopyr TEA	Directed Foliar/cut stump/frill	Post-emergent selective, tank mix with glyphosate or aminopyralid for broader spectrum depending on target species and timing	2.0 a.e. lbs/acre	Later winter thru early fall	Weed control and woody vegetation control	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)
Triclopyr BEE	cut stump/frill/basal stem	Post-emergent Selective	2.0 a.e. lbs/acre	Fall	Woody vegetation control	Diluent (Competitor) No SPI

(1) Cut stump and basal applications are identical considering rate and technique. The difference is the removal of vegetation. Basal treatments are made to intact trees; cut stump requires the removal of the vegetation with only a stump remaining.
*Amounts may vary from year to year depending on a number of variables but will not exceed maximum. Annual specifics of volume, location, and acreage will be described in the annual PUP process.
**Applications in the Pine Hill Preserve will be limited to non-broadcast, targeted backpack methods only.

2.4 LOCATIONS AND PROPOSED MANAGEMENT METHODS

This VIWMP applies to all of the lands in the FERC Boundary, as well as to some roads managed by SMUD outside the FERC Boundary, and includes a number of different types of facilities, which can be grouped into several categories. The strategies, methods, and materials used to treat vegetation at these sites differ depending upon the vegetation management goal for the site. All vegetation management actions will be completed using the Best Management Practices and resource protection measures described in Section 5. The three main categories of sites requiring vegetation management are these:

1. transmission right-of-ways (ROW),
2. roads and trails, and
3. hydroelectric facilities.

The strategies, methods, and materials used to treat vegetation at each type of site within the UARP are described below in Sections 2.4.1–2.4.3.

2.4.1 Transmission ROW

Management of these corridors includes maintaining vegetation that allows for the utility and safety of the feature, while encouraging compatible native habitat. As indicated above, there are about 299 acres of transmission ROW on Federal lands. The North American Electric Reliability Corporation (NERC) imposes regulations surrounding the maintenance of transmission corridors and fines associated with violations. These regulations primarily apply to the minimum allowable distance between energized lines and vegetation; the details about the understory vegetation are not regulated. SMUD manages transmission corridors in terms of zones beneath the overhead lines.

Key to this concept is the distinction of three components of the ROW: the wire zone, the border zone, and the danger tree zone (UARP 2014; Figure 3). The wire zone includes the section of a transmission ROW directly under the wires and extending outward on each side for about ten feet. The wire zone is typically managed to sustain a community of grasses, forbs, and low-growing shrubs. The border zone is the section of the transmission ROW that extends from the wire zone to the ROW edge. The border zone is managed to promote a low growing plant community of forbs, taller shrubs, and low-growing trees. The danger tree zone is located beyond the border zone, and is managed to eliminate trees that could fall and cause an outage (i.e., hazard trees).

SMUD's strategy for transmission ROW vegetation management includes the following:

- elimination of undesirable woody species within the wire zone and around tower sets along the ROW;
- maintenance of low shrub-forbs-grass cover within the wire zone of the ROW;
- maintenance of tall shrub-forbs-grass cover within the border zone of the ROW;

- maintenance of grasses only within a 2,500-square-foot area around tower structures in the ROW (bare earth around the wooden 69-kilavolt (kV) structures on the Jones Fork line, per Cal Fire standards); and
- provisions for worker/public safety.

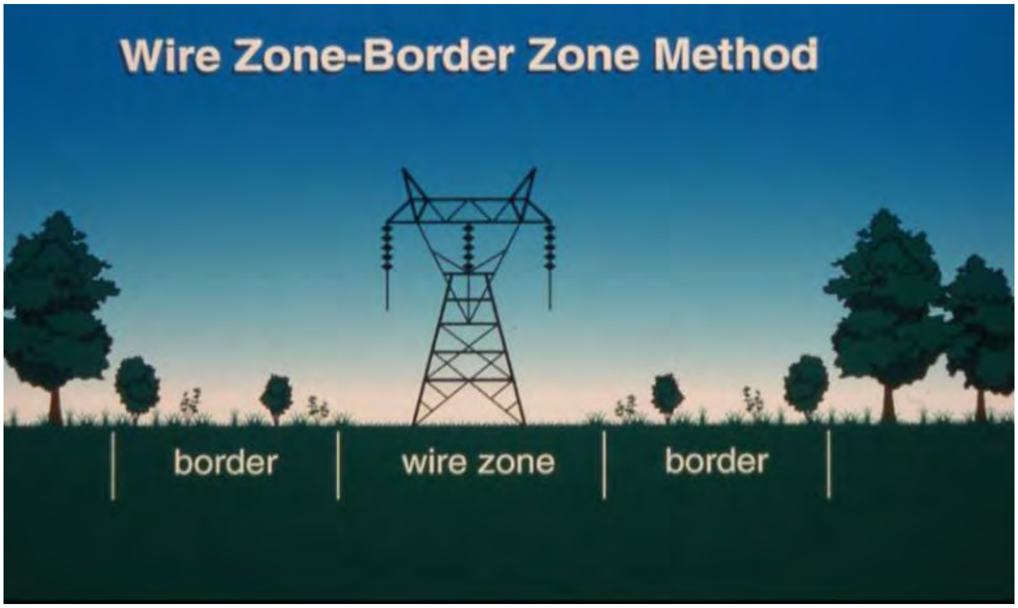


Figure 3. Wire Zone Border Method (Bramble and Byrnes 1996)

This strategy will be accomplished in three phases. The first phase involves the manual and mechanical removal of undesirable vegetation to restore or establish a desirable management condition. The second phase builds on the initial establishment using all available control techniques, including herbicide, to promote the growth of desirable species. The third phase is the long-term implementation of a maintenance program that will allow for the management and enhancement of the facility to the benefit of all stakeholders.

2.4.1.1 Phase 1. Removal of Undesirable Vegetation

Undesirable vegetation is cleared using hand tools, such as gas-powered trimmers or chainsaws, or by mechanical means, using mowers or larger equipment, as described in Section 2.2.

2.4.1.2 Phase 2. Herbicide Application for Maintenance

To continue to manage for desired vegetation, herbicide applications will be considered within 1 to 2 years of initial manual clearing or mastication. Sites proposed for herbicide application will be inspected and evaluated as to their success potential and sensitive resource limitations.

2.4.1.3 Phase 3. Long-Term Maintenance Program

The maintenance phase of the IVM plan for the UARP transmission corridor includes continued management activities (herbicide and mechanical/manual treatments) at treated sites, hazard tree removal, and general management considerations for habitat improvement (i.e., management for desirable vegetation species). Ongoing, annual inspections and assessments will continue to determine where, what, and when to treat the ROW. Prescribed treatments will be made as appropriate and all possible methods of control described in Sections 2.1 and 2.2 will be considered.

2.4.2 Roads and Trails

Access roads and trails will be managed in phases through a combination of manual, mechanical, and herbicide treatments. SMUD has prepared a Transportation and Trails System Management Plan for the UARP (SMUD 2015b). This plan identifies the roads for which SMUD has primary maintenance responsibility, which includes roads within the FERC UARP boundary and roads outside the boundary. When applying herbicides for roadway and trail maintenance, SMUD will follow this VIWMP.

2.4.2.1 Roads

Roadway vegetation will be managed according to the Eldorado National Forest, Standard Road Maintenance Specifications for Roads (March 2014). Specifically, Sections 806, 816, 831, 842 and 854 discuss elements of vegetation control and hazard tree removal. The general purpose of SMUD's roadway vegetation maintenance is to provide for safe travel on roads throughout the UARP. Facility O&M requires a variety of access roads with surfaces that vary from unimproved dirt to asphalt. The road surface and sides are generally managed in bare ground for fire safety. Typically the road bed of a native surface road is relatively barren and does not need to be sprayed; however, there may be occasions when a road needs to be treated with herbicide for safety purposes. The sides may have a drainage ditch that is kept clear of vegetation or kept with low-growing grasses and forbs to keep water from accumulating on the road surface. Some road drainage systems are lined with gravel to reduce erosion.

Trees and woody brush are generally maintained at least ten feet from the edge of the road to allow for adequate visibility and passage without encroachment. In addition to access and general passage, vegetation is thinned at and through corners (i.e., line of sight) to improve visibility and maximize traffic safety. When line of sight is compromised or brush is encroaching onto roadway edges such that vehicle travel is being impaired, manual methods, such as chainsaws and trimmers, will be used to remove vegetation. In some instances in which management has been neglected, it may be appropriate to use masticating equipment mounted on a rubber-tired vehicle with a boom, which allows greater mowing flexibility along the road edge. Where appropriate, herbicides will be applied with the cut stump method to prevent the regrowth of vegetation.

For general maintenance in which brush and tall weeds may be approaching thresholds for affecting line of sight, directed foliar herbicide applications will be made to manage brush and ROW towards the desired condition. Shoulders of paved roads will be maintained to allow for vehicle travel and parking without risk of fire. Invasive weeds occurring in or along access roads will be addressed as part of annual routine operations and maintenance. For the purpose of herbicide applications, methods may include backpack sprayers or ATV- mounted sprayers.

2.4.2.2 Trails

Trails are required for access to canals, penstocks, stream gages, and weirs. These foot trails are generally 2-3 feet wide to allow unimpeded access and are usually managed in either low-growing grasses or bare ground. Trails are established with manual tools, such as chainsaws and trimmers, and the primary mode of vegetation management will be with manual methods. Lop and scatter techniques will be used to dispose of woody materials. Post-emergent herbicides will be applied using targeted foliar applications with backpack sprayers to control undesirable vegetation as needed.

2.4.3 Hydroelectric Facilities

Desired vegetation conditions and treatment methods/strategies for various hydroelectric facilities are discussed in this section and summarized in Table 3. For additional information about all SMUD facilities, please refer to SMUD's UARP Facility Management Plan.

Table 3. Summary of Herbicide Treatments by Facility Type

Facility Type[1]	Desired Condition	Potential herbicide application	Frequency of Treatment/Acres
Earthen Dam/dyke	Low-growing herbaceous cover ok; no woody vegetation; needs to be clear for inspections.	Selective for weeds; Aminopyralid, clopyralid,sulfometuron methyl, chlorsulfuron, Triclopyr TEA; bare ground toes and groin.	Annual/48 ac
Concrete dam	No woody vegetation in groins; needs to be clear for inspections	Directed foliage; imazapyr, glyphosate	As needed/3ac.
Powerhouse	Bare Ground; some herbaceous cover ok	Low boom, backpack directed , Glyphosate, chlorsulfuron, sulfometuron	Annual/7

Facility Type[1]	Desired Condition	Potential herbicide application	Frequency of Treatment/Acres
Penstock ROW	Herbaceous vegetation ok; no woody vegetation over 24”	Directed foliar, basal, cut stump.; triclopyr TEA, triclopyr BEE, Imazapyr, glyphosate	As needed/21
Canal	No woody vegetation; berm needs to be clear of woody vegetation; some low-growing herbaceous vegetation ok		Annual/ 22
Spillway	Bare Ground	Cut stump and directed foliar; glyphosate and triclopyr TEA	Annual/ 4
Switchyard	Bare Ground	Low boom broadcast soil; chlorsulfuron Glyphosate, sulfometuron methyl	Annual/
Gate house/Valve house	Low-growing herbaceous vegetation ok; woody vegetation adjacent to site cleared; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	Annual/2 ac.
Surge Chamber	Low-growing herbaceous vegetation ok; woody vegetation adjacent to site cleared; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	Annual/1
Hydromet station	Low-growing herbaceous vegetation ok; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	As needed/1
Telecom site	Low-growing herbaceous vegetation ok; tall trees cleared, including line-of-site	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	As needed/1
Transmission ROW	Wire Zone-Border Zone concept; low to moderate height woody vegetation ok; no tall trees	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE Weeds; aminopyralid, clopyralid	A portion will be treated annually/300

Facility Type[1]	Desired Condition	Potential herbicide application	Frequency of Treatment/Acres
Roads	Shoulder cleared of tall vegetation out to 5 ft.; some tree & brush removal beyond 5 ft. for better visibility	Direct foliar, Glyphosate and triclopyr TEA, (chlorsulfuron and sulfometuron may be used in limited situations with USFS/BLM approval) low boom or backpack soil to turnouts and shoulders for fuels abatement	A portion will be treated annually/40

Notes:
[1] See SMUD's UARP Facility Management Plan.

SMUD will conduct vegetation management operations as part of general O&M work at hydroelectric facility sites located within UARP boundaries. Specific treatments for the different facility sites are described below.

2.4.3.1 Canal

The top of the canal berm provides access for vehicular and pedestrian traffic and is generally maintained as bare ground. The berm slope can vary in length, and vegetation is managed for grasses and low-growing broadleaf species; woody vegetation is removed. The berm slope must be accessible to check for leakage and vertebrate pest problems. The berm access road must also be kept clear of vegetation to provide safe access for staff and the public, as well as to discourage vertebrate pests from invading the area.

Along the top 10 feet of the canal berm and the face of the berm down to the toe, chainsaws and trimmers will be used to control woody species greater than 24 inches tall. Hazard trees may also need to be occasionally removed adjacent to the canal. Both pre-emergent (soil applied) and post-emergent herbicides will be used. Low-volume, directed foliar and low-volume basal applications with backpacks will be used to control re-sprouting woody plant species that are encroaching on the berm, ingress and egress points, and canal berm face and toe. Backpack applications may be made from the canal access road to the canal berm (not inside the canal face). These applications will utilize non-selective, pre-emergent herbicides or targeted, foliar post-emergent herbicides. Only backpack applicators will be used on the canal berm adjacent to the water.

The in-slope (water) side of the canal is kept free of woody vegetation (where the canal is not lined with concrete or synthetic barrier) for approximately ten feet above the ordinary high water mark (OHWM). Herbicide applications on the inner berm would be done when the canal is dewatered. Chainsaws and trimmers will be used for control of woody species greater than 24 inches tall along the top 10 feet of the canal bank. Low-volume, directed foliar and cut surface treatments, using glyphosate (aquatic) imazapyr (aquatic) and Triclopyr TEA within 10 feet of water along the canal, will be used to control any re-sprouts of woody plant species encroaching on the canal channel and to encourage annual grasses and broadleaf species. Pre-emergent applications will not be used in this situation. The control of woody species is necessary to maintain flow and prevent blockage. The herbicide treatment will be applied with backpack sprayers when the canal is de-watered.

2.4.3.2 Penstocks

Generally, a 10-foot area on both sides of these structures requires vegetation management. The vegetation in this zone can be managed for grasses/forbs or bare ground, depending on soils, slope, and specific maintenance requirements. For ten feet on each side of the penstocks, chainsaws and trimmers will be used for control of woody species greater than 24 inches tall. Hazard trees adjacent to the penstock may also need to be occasionally removed. A low-volume, directed foliar post-emergent herbicide treatment will be applied to re-sprouting woody plants to promote better access, to encourage the development of low-growing herbaceous plant cover, and to aid routine inspections. Post-emergent, directed or broadcast applications will be used and treatments will be made with backpack sprayers.

2.4.3.3 Dams

Earthen dams generally have three zones that require vegetation management:

1. The top of the dam is generally graveled and requires a bare ground treatment. Pre-and post-emergent herbicide applications with backpack sprayers will be used to maintain these facilities.
2. The inside slope can be managed in grasses. Trimmers are used to control excessive vegetation and chainsaws are used to control larger woody species that are proximate to the dam to eliminate habitat for rodents and to allow for inspection. No herbicides would be used.
3. The outside slope is generally managed in low-growing grasses/forbs and requires control of woody trees, brush species, and tall herbaceous vegetation with trimmers and occasionally chainsaws to maintain facility integrity, allow for inspection, and eliminate habitat for rodents. The groins and toe must be maintained with minimal vegetation to allow for inspection, discourage rodent activity, and prevent roots from impacting structural integrity. Cut-stem or frill treatments with herbicides will also be used to maintain control of woody vegetation. Directed foliar backpack applications will be used in situations where vegetation is excessive and mechanical weed trimming is not practical.

2.4.3.4 Concrete Dams

Vegetation at groins must be managed and kept free of woody species that could impact the structural integrity and prevent unobstructed visibility during inspections.

Chainsaws and trimmers are used for control of woody species at specific locations, as required by the Division of Safety of Dams and FERC inspectors. A low-volume, directed post-emergent herbicide treatment will be used to control resprouting vegetation at dam sites. Cut-stem or frill treatments with herbicides will also be used, as needed, to maintain control of woody vegetation.

2.4.3.5 Powerhouses and Switchyards

The land within the switchyards and substations is generally maintained in a bare ground condition or is covered with gravel or asphalt in order to protect electrical equipment and to minimize fire and safety hazards. Trimmers and mowers cannot be used adjacent to insulators and conductors due to safety considerations. Pre-and post-emergent herbicides will be used to maintain these facilities in a bare ground condition. Broadcast pre- and/or post-emergent applications will be made with backpack sprayers. Hazard trees may also need to be occasionally removed adjacent to these facilities (refer to Section 2.5 below). In addition, trees surrounding these facilities that block communication transmitters and receivers occasionally need to be trimmed or removed.

2.4.3.6 Weirs

Weirs are structures that are used to measure water flow and are commonly located below dams to measure leakage or minimum flows. The weirs must be relatively clear of vegetation to facilitate inspections and accurate measurements. Low-growing grasses are usually the preferred vegetation cover. Trimmers, chainsaws, and hand-tools will be used to control vegetation near the concrete weirs.

2.4.3.7 Spillways

Spillways are located below dams and canals and connect to natural drainages. Spillways that are associated with dams and canals are designed to protect these facilities during high intensity storms or emergency events by diverting excess water into natural drainages. The density and type of vegetation within the spill channel must not impede the flows, as this could cause the water to exit the natural drainages and result in flooding or erosion. No vegetation should be present in concrete-lined spillways; low-growing forbs and grasses are the preferred cover on the bottom and sides of unlined spillways (a few spillways have natural rock bottoms and no concrete lining). Manual removal of brush and trees, coupled with cut-stem herbicide applications, will be used. Directed-foliar, backpack applications to berries, small trees, re-sprouting brush, and weeds will be used as needed when the spillway is not actively flowing. Only herbicides approved for aquatic applications will be used, as listed above in Table 2.

2.4.3.8 Telecommunication and Hydromet Facilities

Vegetation management at these facilities is primarily by manual means to control vegetation encroaching on the site and to maintain line-of-sight between telecommunication facilities. This will involve targeted tree trimming and tree removal on an infrequent, as-needed basis. SMUD will dispose of removed vegetation in accordance with Forest Service protocols in effect at the time the work is performed. Directed foliar backpack applications will be used around the base of these sites as appropriate.

2.5 HAZARD TREE IDENTIFICATION, REMOVAL AND DISPOSAL

There are several vegetation clearance requirements for transmission ROWs regulated by the California Public Utilities Commission, California Resource Code, North American Electric Reliability Corporation (NERC), and Federal Energy Regulatory Commission (FERC). NERC, in particular, requires that Minimum Vegetation Clearance Distances are maintained for separation between transmission conductors and vegetation. Appendix B provides the clearance requirements in order to meet NERC (and other) regulatory standards. Trees at heights beyond the minimum clearance standards are considered hazard trees.

Hazard trees are also those with structural defects resulting in the potential for the tree to fail and cause damage to people, property, or facilities. Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The evaluation system includes the following:

1. development of species' profiles to identify specific failure patterns;
2. consideration of site characteristics, such as general climate and precipitation, management history, soils and local hydrology, history of the site pertaining to hazard trees, site changes over time, and obstructions to tree development;
3. stand considerations (i.e., trees in closed stands have a different canopy structure and trunk development than open-grown trees);
4. tree growth and form, including crown form, trunk aspect, and overall health;
5. tree defects (root crown, trunk, and branches);
6. maintenance history (i.e., previous pruning); and
7. evaluation of potential targets.

Sites are evaluated annually. Following the evaluation, trees requiring abatement are prioritized based on their overall risk. SMUD intends to implement, where appropriate, the International Society of Arboriculture's (ISA) Best Management Practices for Tree Risk Assessment for evaluation of hazard trees along SMUD electric overhead facilities. Hazard tree identification would be performed by a certified arborist or natural resource professional with a Tree Risk Assessment Qualification (TRAQ) from the ISA or equivalent. This qualification from ISA trains arborists to use a standardized system to identify and assess risks from hazard trees and promotes the safety of people and property. The USFS and BLM will be provided a list annually (or as needed) that indicates the type, sizes and locations of hazard trees to be removed. The USFS and BLM will review and provide approval as necessary and appropriate.

Hazard tree abatement includes trimming, topping the tree to a safe distance, or complete removal. Mechanical means are typically used and adjusted per specific site conditions. Once removed, debris and tops are chipped, lopped, or burned, where possible. Any remaining wood and logs are disposed of in accordance with Forest Service requirements or are left in place and secured to prevent rolling off target or moving down slopes.

3.0 MONITORING AND REPORTING

Monitoring refers to the repeated measurement of activities and conditions over time. A number of ongoing monitoring activities are associated with this VIWMP and each are discussed below. Some monitoring activities will be regimented and others will be more casual observations. Reporting on the results of the monitoring will also take a variety of forms, such as a verbal conversation about monitoring results and an email or a written report.

3.1 ANNUAL COORDINATION

Each year SMUD will provide the land managers (Forest Service and BLM) a summary of the season's invasive weed and hazard tree mitigation management actions, along with any possible results of effectiveness monitoring, by September 30. SMUD will also present a summary of invasive weed treatments from the previous season at the Annual Review of Ecological Conditions meeting each May. A Pesticide Use Proposal (Form FS-2100-2) for application of herbicide on lands owned by the Forest Service and BLM lands where it is appropriate to do so, will be completed and submitted by December 1 for treatments planned for the following calendar year. SMUD will also include additional information about the proposed treatments with the PUPs, which would include the following:

- A map and GIS data showing locations to be treated along with adjacent sensitive resources
- A list of locations identifying what type of invasive weeds will be treated and proposed treatment method
- An approximate timeline of treatments, including invasive weed treatments to ensure timing of weed treatments coincides with best management practices for weeds
- Any proposed revegetation

The Forest Service and BLM will provide approval of the PUPs by February 15 of the following year. SMUD and the land managers will hold a meeting in January to discuss the proposed treatment recommendations for the upcoming year and/or modifications of items in this VIWMP (i.e., target species, survey areas, treatment methods, etc.). SMUD will present a summary of invasive weed treatments from the previous season at the Annual Review of Ecological Conditions meeting each May.

3.2 ANNUAL EFFECTIVENESS MONITORING

There are two basic situations under which vegetation management occurs at SMUD facilities. In some cases, sites are treated annually to keep unwanted vegetation under control. Switchyards, powerhouses, and dams are examples of the first situation. For these sites, SMUD will monitor the treatment effectiveness after the applications and determine if follow-up vegetation management activities are necessary. A monitoring form will be developed; will document presence of invasive species, type and relative amounts of vegetation (undesirable woody or herbaceous), density of vegetation; and will describe why amounts are/are not acceptable. Additional annual inspections by DSOD and FERC occur at most facilities and, if vegetation conditions are unacceptable, treatments may occur immediately or the following season, as conditions warrant.

The second situation involves sites that are treated based on observed conditions during annual monitoring. Transmission and penstock ROWs are examples of this second type of site. Prior to the start of vegetation management activities for the season, SMUD will visit these types of sites to determine if any vegetation management is necessary. Ratios of compatible to incompatible species will be assessed. Population densities of target species listed on the pest control recommendation and cited in the PUP will be evaluated, and efficacy of prior treatments will be determined. Monitoring must occur early in the season prior to prescription of vegetation management methods and preparation of the pest control recommendation by the PCA. Follow-up monitoring will occur 6 to 8 months after treatment to determine efficacy, if weather permits.

Annual effectiveness monitoring will include monitoring invasive weed infestations that are currently targeted for control or eradication. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments or potentially different treatment strategies are needed. If new treatment methods or strategies (not identified in this plan) are recommended for an infestation SMUD would provide the USFS and/or BLM with the rationale for the proposed changes during the annual coordination meeting. Where past treatments have successfully controlled or eradicated an infestation, SMUD will continue to monitor the infestation annually until it is determined that treatment objectives have been met (based on expected seed bank longevity of the targeted species).

For any invasive weed treatments performed in any given year by SMUD, SMUD will perform post application monitoring to document the efficacy of the treatment. In most cases, the goal will not be to eradicate the population unless it is a USFS-Group 1 weed, an isolated population of a Group 2 weed, or its considered a “Potential Invasive”. If eradication is the management goal, SMUD will perform a detailed estimate of the population remaining later in the season and again the following year to document whether any of the weeds are still present. If weeds are still present, SMUD will continue to treat (using any of the approved techniques or herbicides) until the population is eradicated. If after 3 years of continuous treatment, the population persists, SMUD will work the USFS or BLM to re-evaluate whether eradication is the appropriate management strategy. For other weeds, where eradication is not the goal, SMUD will provide an estimate of weed cover and continue to treat sites according to the management priority identified in the annual list of invasive plants

3.3 POST-CONSTRUCTION/REVEGETATION MONITORING

Following identification of a potential revegetation site and following implementation of revegetation actions (if there are any), monitoring will occur annually for a minimum of 3 years to determine whether to reseed. Where revegetation objectives have not been met, additional treatments will be implemented. Following ground disturbance in which there is a potential to introduce invasive weeds, monitoring would also occur for 3 years to determine if control is needed. Qualified personnel, familiar with vegetation communities within the UARP boundary, will perform the monitoring. Results will be reported at the annual meeting with the USFS and BLM (as discussed in Section 3.1).

Qualitative surveys, consisting of a pedestrian visit to estimate percent cover, distribution, and density of plant species, will be completed during each monitoring visit. Qualitative data is considered appropriate due to the small scale of the revegetation activities included under the VIWMP. Dominant species will be recorded along with any invasive weeds and their relative abundance. As appropriate, representative photographs will be taken at revegetation sites to more accurately depict changing conditions over time and to facilitate future management decisions.

For erosion control purposes there must be 70% or greater effective soil cover on slopes exceeding 35%, shallow or other soils with high runoff potential, or soils within RCAs (widths as defined on page 42 of the SNFPA). For all other areas, soil cover should be 50% or greater. If vegetation does not provide soil cover it should be provided by straw or other approved mulch. If vegetation provides this level of coverage then revegetation will be considered successful. If vegetation does not provide the level of soil coverage but vegetation is commensurate with surrounding vegetation and adequate mulch is covering the soil then the site will be considered restored. It is not necessary to consider effective soil cover where soil cover is not normally expected such as road treads, quarries, or other areas that were previously substantially devoid of vegetative cover.

3.4 COMPREHENSIVE UARP BOTANICAL SURVEYS

Every 5 years, a comprehensive survey for special-status plants with suitable habitat in the project area and invasive weeds will be performed at SMUD facilities (i.e., in transmission ROW, along SMUD-owned roads, and adjacent to hydroelectric facilities) within the UARP boundary, except in areas where activity is non-existent or minimal.

For example, surveys will not be conducted along ROWs for underground penstocks/tunnels or in areas that cannot be traversed safely on foot. Furthermore, SMUD will survey around active recreational facilities (campgrounds and boat ramps) and at selected dispersed camping areas within the UARP boundary that are under Forest Service management (in consultation with the Forest Service). For some limited situations, SMUD may increase the survey coverage area outside the FERC boundary if there is a compelling reason to do so. This will be determined in consultation with the USFS/BLM prior to beginning the 5-year survey effort.

3.4.1 Survey and Mapping Methods

The survey would take place across a single season and begin at lower elevations and proceed to higher elevations, which should allow for all plants to be assessed at an appropriate phase of phenology for identification purposes. However, specific survey areas may require more visits, depending on the timing of the bloom of the species and climate conditions. SMUD will consult with the land management agencies prior to the surveys to discuss logistics and other items of concern and to get the latest weed and sensitive plant lists.

SMUD shall conduct thorough pedestrian surveys of all identified facility locations within the UARP for special-status and invasive species. The extent of the survey at any particular site would be discretionary based on conditions observed by the surveyor and landscape features, including habitat, soil type, etc. Field surveys shall be conducted to the intensity necessary to discover the plants.

Specific survey protocols are as follows:

1. All sensitive natural communities, such as lava caps and fens, located within survey areas shall receive “Complete Coverage.” “Complete Coverage” is defined as areas to be surveyed by walking transects spaced so that that the next transect is clearly visible and so that all of the areas have been examined thoroughly.
2. Roadside buffers within and adjacent to designated survey areas shall receive Complete Coverage within approximately 10 feet of the roadside. There may be exceptions to the standard 10-ft roadside buffer and botanical survey specifications and these will be discussed at the annual coordination meeting
3. Transmission corridors shall receive Complete Coverage in the wire and border zones and Intuitive Coverage in the off-ROW or danger zone. “Intuitive Coverage” requires areas to be surveyed by walking transects that cover a representative cross section of all major features and habitats within the immediate area. Habitats with low potential for the species (as determined by the qualified surveyor onsite and based on current site conditions) shall have at least 10 percent of the area covered with transects. Habitats identified as having a high-to-moderate potential for the species shall have at least 75 percent of the area covered by transects.

4. Structures and other facilities (i.e., buildings and other SMUD infrastructure) shall be surveyed with Complete Coverage.
5. Recreation sites shall be surveyed with Intuitive Coverage.
6. Only invasive weed occurrences that are rated by the California Department of Food and Agriculture as “A”, “B,” or “Q,” and by the Eldorado National Forest (ENF) or BLM lists as targets for treatment, will be mapped. Occurrences of new invasive weed species that are of concern will also be mapped (Group 1-3 and any on the Potential List).

Invasive species occurrences shall be recorded within and directly adjacent to the UARP boundary; however, if occurrences of invasive weeds originate within the boundary and extend into National Forest System lands, and BLM lands where it is appropriate to do so, the extent of any occurrence attributed to project activities shall be recorded up to 300 feet from the boundary. Treatment of extensive populations beyond the UARP boundary, if applicable under the license, would be accomplished after consultation with the Forest Service and/or other agencies as appropriate. Species nomenclature shall follow the Jepson Manual, or abbreviations shall follow the Natural Resource Conservation Service (NRCS) National Plant Database symbol protocol from the NRCS website.

Previously mapped occurrences of both special-status and invasive species that occur within the survey area will be verified and recorded as unchanged or updated, as appropriate. New species populations identified during surveys will be delineated using the latest, available electronic methods, as described below:

1. Sensitive/Watch List Species and Sensitive Habitats
   a) Hang 2-foot pink/green flagging (or flags consistent with ENF standards) about every 25 feet around the perimeter of the occurrence or special habitat, upon discovery.
   b) Label one set of flagging (Informational Flag) nearest the logical access point to the site perimeter with the species code, occurrence number, date, and surveyor’s initials in permanent black ink. For example, “CACLA-09 12 May 2016 CB.”
   c) By using Global Positioning Systems (GPS) along the perimeter of each occurrence or special habitat and including data on discovery forms and submitting data as an ArcGIS shapefile. The GPS locations should have a horizontal accuracy of a minimum of 5 meters. Polygons are the preferred GPS method; however, point data will be collected for occurrences with an area less than 2,500 square feet (about 50 feet by 50 feet), and line data will be collected for occurrences limited to roadsides. Point or line data will be buffered to create a polygon for submission to the Forest Service. The mapped locations shall be recorded in the following coordinate systems (or in whatever system is consistent with ENF standards at the time of the survey): NAD 1983, CONUS, UTM Zone 10, and meters.

d) Complete the Sensitive Plant Occurrence Discovery Record form using the most efficient method available (see Appendix C).

2. Invasive Species Infestation
   a) Hang 2-foot orange invasive plant flagging (or flags consistent with ENF standards) approximately every 50 feet around the perimeter of the infestation, upon discovery. Flags shall be hung as near to eye-height as possible.
   b) Label one set of flagging (Informational Flag) nearest the logical access point to the site perimeter with the species code, infestation identification, date, and surveyor's initials in permanent black ink. For example, "CHJU-03 12 May 2016 CB."
   c) GPS the perimeter of each infestation on discovery and submit to Forest Service and other resource agencies upon request as an ArcGIS shapefile. Polygons are the preferred GPS method; however, point data will be collected for occurrences with an area less than 2,500 square feet (about 50 feet by 50 feet), and line data will be collected for occurrences limited to roadsides. The GPS should have an accuracy of at least approximately 5 meters. Point or line data would be buffered to create a polygon for submission to the Forest Service. The mapped locations shall be recorded in the following coordinate systems (or whatever system is consistent with ENF standards at the time of the survey): NAD 1983, CONUS, UTM Zone 10, and meters.
   d) Complete the Invasive Weed Monitoring form using the most efficient method available and document the infestation with a photo and point record, if appropriate (see Appendix D).

All occurrences of invasive species will be documented (some low priority, ubiquitous weeds may not be mapped if the land managing agencies agree that mapping is not useful). Occurrences of invasive weeds, which are not targeted for control, may be recorded, if deemed necessary, following consultation with the land managing agencies.

3.5 AQUATIC WEED MONITORING

There are currently no known aquatic weed infestations within the UARP boundary. SMUD currently monitors the major recreational reservoirs (Union Valley, Ice House, and Loon Lake) for other aquatic invasive species periodically during the recreation season. As a component of SMUD's aquatic weed adaptive management program, SMUD will perform simple presence/absence surveys for aquatic weed species of concern, in conjunction with monitoring efforts for invasive aquatic invertebrates at boat ramps. If the presence of an undesirable aquatic weed is confirmed, SMUD will consult with stakeholders as soon as reasonably possible to determine follow-up actions.

3.6 PESTICIDE USE REPORTING

Forest Service Handbook 2109.14 (USFS 2016a) guides pesticide use on National Forest System (NFS) lands and requires compliance with Forest Service standards and guidelines and other management direction. Licensed Pest Control Advisors (PCAs) will manage and prepare all recommendations for the use of herbicides. Herbicides are used to help control unwanted vegetation. In each specific location, a PCA will evaluate a variety of environmental and biological factors. These factors include, but are not limited to, the following: existing vegetation composition; topography; soil type; hydrologic features; surrounding wildlife, including Threatened and Endangered species; domestic animals; livestock; resident adjacency; apiaries; and proximity to and volume of recreational use. Based on this evaluation process, the PCA will determine the appropriate product, application rate, timing, and method for each location. The annual PUPs submitted to the ENF for approval will identify the specific chemicals recommended for a specific locale.

SMUD has proposed, in this plan, a vegetation management program that provides the flexibility to make the best use of a variety of proven herbicides to adapt to changing circumstances for the protection of facilities and forest resources. Any new herbicides proposed would require approval by the USFS or BLM. A GIS layer with area treated, methodology, and chemical information will be submitted to FS by September 30th to allow for FS data entry for their annual pesticide application reporting requirements due in mid-October. At the end of the season, SMUD will submit a Pesticide Use Report to the ENF, which describes the locations and amounts of each pesticide applied during the season. If pesticides are applied to BLM land, SMUD will report usage totals to BLM as well.

3.7 WATER QUALITY MONITORING

SMUD will monitor water quality of perennial streams adjacent to treated areas to document the effectiveness of proposed buffers for one year. Water samples will be collected above and below a subset of treated areas before and after applications and within 60 days of the herbicide application. The number of water samples collected will depend upon the size of the treatment area, which will vary from year to year. SMUD's contractor will take pre-application samples no earlier than 2 weeks prior to the herbicide application. Post application samples will be taken within 24 hours of the first rainfall greater than ½ inch. If there is no rain event that produces greater than ½ inch within 60 days of treatment, no water quality monitoring will occur that treatment year.

Collected samples will be shipped to a qualified laboratory, which will test for the specific herbicides that are applied. Water quality monitoring is not proposed for Project lakes, canals, or seasonal streams within the Project area. SMUD will submit a water-quality monitoring report to the ENF for the year samples were taken. The report will document where, when, and how water samples were collected, when they were taken in proximity to the application date, and the laboratory results of those samples. Sampling, analysis, and reporting will follow the Water Quality Monitoring Plan (see Appendix E: Water Quality Monitoring Plan). Results of each year's monitoring will be discussed at the annual meeting between SMUD and the Forest Service. In consultation with the Forest Service, application methods and/or stream buffers may be adjusted. Following one year of monitoring, there will be no further Water Quality Monitoring unless a new herbicide is added to the list or there are positive detections of herbicides in surface waters.

4.0 REVEGETATION

4.1 CONDITIONS FOR REVEGETATION

Surveys have not identified any areas needing revegetation. If areas are subsequently identified, revegetation associated with the VIWMP will be directed to small areas less than 0.25 acre. Any revegetation or restoration efforts requiring action on areas greater than 0.25 acre of continuous land will not be performed under this VIWMP. These larger efforts (greater than 0.25 acre) will be addressed in separate and site-specific restoration planning documents that will be reviewed by the Forest Service or BLM, per all applicable FERC license conditions, prior to implementation. Areas subject to revegetation under the VIWMP include, but are not limited to, the following:

- areas within the UARP boundary that are subject to O&M, such as erosion control, minor site improvements, and general maintenance; and
- areas where invasive species have been removed through IVM and passive revegetation is deemed insufficient.

1. Once a potential revegetation site has been identified, an evaluation of the area will be performed to determine whether and when actions should occur. The decision to proceed with revegetation will be based on several criteria. First, the amount of usual disturbance is minimal enough to reasonably allow for revegetation success. Then, if two or more of the following conditions are met, SMUD will proceed with revegetation planning and implementation as described below in Section 4.2.
2. Native vegetation cover is less than or equal to 30 percent of the surface area of the site, when compared to similar sites on adjacent, undisturbed areas.
3. Erosion is evident or there is a high potential for site degradation from erosion; or
4. Passive revegetation from surrounding native communities is unlikely due to the following (excluding BLM, Pine Hill Preserve lands):
    a. Slow rate of propagation and growth of adjacent native species;
    b. Little or no evidence of successful reproduction of adjacent native species;
    c. Low composition or cover of adjacent native species;
    d. High percentage of non-native species nearby;
    e. Continuous disturbance in adjacent areas;
    f. A natural change in native species composition between the proposed site and surrounding areas; and
    g. Soil compaction.

If none or only one of the criteria are met, then the site will be monitored annually for a minimum of 3 years. If conditions degrade within the 3-year period, the site will be reevaluated in consultation with the Forest Service or BLM. If conditions remain unchanged, additional annual monitoring may be warranted. No action will be undertaken for sites that show improved conditions or passive revegetation within the 3-year monitoring period.

For sites that do not require revegetation, erosion control measures will still be employed. These include the use of weed-free straw mulch (state certified as available), certified weed-free straw wattles (100% natural fiber, loose-weave design as available), and/or silt fencing.

4.2 REVEGETATION METHODS

SMUD will collect the following information prior to revegetation:

- Location and general site conditions, such as general vegetation community, slope, terrain, shade, land use, access, and proximity to known sensitive biological resources;
- Summary of invasive plant occurrences in the immediate vicinity; and,
- The composition and density of native species.

SMUD will provide this information to the ENF and/or BLM and consult with an ENF or BLM botanist to determine the appropriate seed mix, which will consist of readily available species. On BLM lands, the use of materials from local native plants is preferred, and if this source of plant materials is not available, passive revegetation is recommended. Minor site preparation methods, like raking, tilling/ripping soil, will be employed at compacted sites to improve seed bed if necessary. Culturally important plants will be used, as appropriate and feasible, for revegetation activities, per FERC license Condition No. 39. Two seeding techniques may be used for revegetation: hydro-seeding and hand broadcasting. Hydro-seeding will be employed in larger areas if an appropriate hydro-seed mix is available (i.e., if it is approved by ENF). SMUD will use non-toxic binders and will submit any hydro-seeding mix to the ENF or BLM for approval. Hand broadcasting will be used as needed for more focused applications where hydro-seeding cannot be employed. When hand broadcasting is used, a light layer of mulch (certified weed-free straw) will be used to protect the soil and to provide additional soil moisture to facilitate germination. Follow-up effectiveness monitoring and success criteria for such revegetation sites is described in Section 3.3.

5.0 HUMAN AND RESOURCE PROTECTION MEASURES

Protection measures that will be employed by SMUD to minimize potential impacts to natural resources and human health and safety are provided in this section, including in the tables below. These protection measures were derived from several sources, including the Forest Service polices contained in the Region Five Water Quality Management Handbook, the National Best Management Practices for Water Quality Management on National Forest System Lands (USFS 2012), and the Human Health Risk Assessment (Appendix A of VIWMP). SMUD's Vegetation Manager, along with SMUD's PCA and PCO, will be responsible for ensuring the protection measures are employed in all situations in the UARP. A checklist will be developed using the protection measures in this document, and this checklist will be completed prior to each vegetation management project.

Appendix F includes the Terrestrial and Aquatic Wildlife Biological Evaluation (BE)/Biological Assessment (BA), and Appendix G includes a Botanical Resources BE. These reports provide detailed analyses of the potential impacts from implementation of the VIWMP, and the following BMPs and resource protection measures are designed to avoid all impacts to special status species.

5.1 ANNUAL EMPLOYEE EDUCATION AND AWARENESS TRAINING

SMUD currently conducts annual employee education and awareness training to ensure all personnel are appropriately informed about environmental protection measures that are requirements of Operation and Maintenance (O&M) within the UARP Project Boundary under the FERC license (FERC 2101). In addition to the existing training, SMUD will conduct (with the assistance of experts from the Forest Service and other stakeholders as feasible and appropriate) annual training specifically related to the VIWMP for personnel directly involved in implementing this VIWMP. Training will include (at minimum) the following:

- a general overview of VIWMP techniques to be performed in the upcoming year and any special constraints;
- brief life history review and identification guidance for special-status and invasive species;
- occurrence information for known sensitive biological resources (i.e., habitat, Protected Activity Centers [PACs], and special status plants and wildlife, such as Valley Elderberry Longhorn Beetle [VELB]) within the vicinity of IVM to be collected as part of surveys performed in the upcoming year;
- Avoidance and Minimization Measure protocols; and
- reporting procedures and requirements.

5.2 WATER QUALITY PROTECTION MEASURES

Best management practices (BMPs) are an important part of this program. Stream buffers were reviewed and modified, following the Sierra Nevada Framework (U.S. Department of Agriculture [USDA] 2001, 2004). The United States Forest Service National Core BMPs apply Nationwide as water quality protection measures. The following Regional BMPs are non-point source pollution control measures that were developed and documented cooperatively between the California State Water Quality Control Board and the U.S. Forest Service (USFS). Applicable BMPs and their objectives, as described in the “Water Quality Management for Forest System Lands in California, Best Management Practices” (USDA 2012), are listed in Table 4.

Table 4. Water Quality Best Management Practices (USFS National Core and Regional BMPs)

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
BMP-1	In general, removal of riparian vegetation will be kept to a minimum to the greatest extent possible. Riparian vegetation known to support special-status wildlife species that interferes with SMUD facilities will be removed or treated per limiting operating periods (i.e., outside the nesting season of an avian species) or under direct species-specific mitigation as outlined in the FERC license or as requested by project stakeholders.	Chem-3	--
BMP-2	When conducting an IVM assessment, consider all potential treatment methods, and assess the potential wildlife and habitat impacts of each (SMUD's vegetation management team will review maps of special-status species during the planning stage of vegetation management projects).	Chem-1, Veg-1	--
BMP-3	Surveys for special-status plant and invasive weed populations will be completed every five years and communicated to SMUD managers and agency stakeholders. Prior to management, special-status plants will be flagged, and chemical treatments will be avoided using the agreed upon buffers (see Appendix F). This measure is repeated in Table 6, PM-8.	Chem-1	--
BMP-4	Annual employee awareness training (see Section 5.1) shall be implemented to ensure that all personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources and invasive species considerations.	Chem-1	
BMP-5	SMUD IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance, as well as removal of shade and native vegetation or topsoil. This measure is repeated in Table 6, PM-16.	Chem-1, Veg-1, Veg-8	
BMP-6	SMUD will revegetate areas as appropriate and as soon as possible to prevent erosion and to reduce the chance for unwanted invasive species.	Veg-2, Veg-8	5.4
BMP-7	To avoid or minimize unnecessary or excessive vegetation disturbance, SMUD will remove vegetation from swales, ditches, and shoulders, and cut and fill slopes only when it impedes adequate drainage, or vehicle passage, or when it obstructs necessary sight distance.	Road-4	--
BMP-8	SMUD will use low-ground-pressure equipment to minimize soil disturbance. SMUD will conduct mechanical activities when soil conditions are acceptable to reduce compaction, soil displacement, and erosion.	Veg-8	5.6
BMP-9	SMUD will complete Water Quality (WQ) monitoring for specific herbicides within perennial waters according to the Water Quality Monitoring Plan (see Appendix E) in order to determine if there have	Chem-6	5.9

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
	been any offsite movement of herbicides into surface waters.		
BMP-10	Follow-up Monitoring: SMUD will keep detailed records and perform follow-up monitoring for effectiveness and undesirable impacts.	Chem-6	5.9
BMP-11	Mechanical equipment will be restricted to slopes generally less than 35 percent; when within Riparian Conservation Areas (RCAs); mechanical treatments will be minimized on moderate slopes (15-30 percent) and restricted to slopes less than 30 percent. Newer equipment may be used on slopes up to 40% in transmission ROW (e.g., mastication). This would be on transmission ROW using tracked masticators. May need to be less for RCAs depending on slope stability and soils.	Veg-1, Veg-2, Veg-8	5.2
BMP-12	Vehicles will not be allowed within Aquatic Management Zones (AMZ) areas; only hand-operated equipment will be used within 50 feet of meadows, springs, and wetlands. AMZ's in the field will be marked. Vehicles will not be allowed within 100 feet of perennial or intermittent streams or within 50 feet of meadows, springs, and wetlands; only hand operated equipment will be used in the these areas.	Plan-3, Veg-2, Veg-3, Veg-8	5.3
BMP-13	Trees will be retained in riparian areas to the maximum extent possible to retain canopy cover.	Veg-3	--
BMP-14	SMUD PCOs will apply chemical treatments according to label directions, prescriptions, and all applicable laws and regulations governing the use of pesticides; pesticide label requirements will be followed. A licensed Pest Control Advisor (PCA) will be consulted in the planning and execution of all herbicide applications. Individuals with a Qualified Applicator's License or Certificate (QAL or QAC) from the California Department of Pesticide Regulation (Cal DPR) will oversee applications on the ground.	Chem-1, Chem-2, Chem-5	5.8
BMP-15	When using herbicides, SMUD PCO's will use the most specifically targeted application method that can effectively achieve program goals.	Chem-1	--
BMP-16	SMUD will implement the Pesticide Spill Contingency Plan (see Appendix H) to reduce contamination of water by accidental pesticide spills.	Chem-2	5.10
BMP-17	PCOs will follow safe procedures for transporting, mixing and loading herbicides by instituting the following measures: PCOs will limit the amount of herbicide that is transported in a vehicle to that which could be batched and used in a single day. Typically, that would be no more than enough to create 200 gallons of final mix, which will be mixed in batches as needed, not all at once. PCOs will transport herbicides in a spill-proof, non-food container if they are not using the original container. PCOs will mix and load herbicides only in pre-designated areas, outside of RCAs. They will select areas where a potential spill would	Chem-1, Chem-2, Chem-5	5.8 5.10 5.11

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
	be most easy to contain and would have the least impact. PCOs will add a marker dye to the herbicide mixture so workers can readily see any spills. Dye also helps workers see any drift or mis-application to non-target plants, and it helps them monitor where they have sprayed previously. PCOs will carry a spill kit to contain and remove any spills immediately and will train crews on procedures for doing so. PCOs will carry soap and water to wash spills off of hands, feet and legs, and bring extra gloves. PCOs will triple-rinse emptied herbicide containers into the sprayer at the time of use and utilize these spray rinses in areas allowed by the herbicide label.		
BMP-18	PCA's will consider the effective timing of the herbicide and application technique to be used based on its “mode of action” and the target plant’s annual growth cycle. Efficacy, efficiency, and environmental constraints will dictate treatments. The most effective treatments result in the least amount of entries. Anything above 85% control is considered commercially acceptable.	Chem-1	--
BMP-19	SMUD PCA's will restrict chemical treatments to areas outside appropriate buffers RCAs, wetlands, and waters. They will map or flag waters, wetlands, and riparian areas. No mixing or loading will occur within 200 feet of any stream, wetland, or other sensitive riparian or aquatic site.	Chem-3	5.12
BMP-20	Measures to control pesticide drift during spray application will include, but are not limited to: • Using ground-based application equipment; • Using spray nozzle that produces 350 micron or greater droplets; • Using nozzle pressures below 25 PSI on backpacks; • Using spray nozzles no higher than 2 feet from the ground; • Using ground application directed away from non-target vegetation. Drift reduction nozzles may be employed where warranted.	Chem-3	5.13
BMP-21	Chemical treatments shall occur when weather and soil conditions are favorable. Application can proceed if weather conditions appear favorable, which is when there is a 30% or less chance of rain on the day of application (according to NOAA); if precipitation is predicted within 48 hours, the amount predicted shall be no more than ¼- inch; sustained winds are less than 5 MPH; and rain does not appear likely at the time of application.	Chem-1	5.13
BMP-22	A licensed PCA will prepare the Pesticide Use Recommendations based on site-specific conditions, including soils, slopes, and vegetation composition.	Chem-1	5.8
BMP-23	PCA herbicide applications will comply with product label directions and applicable legal requirements. Herbicide applications will treat the minimum area necessary to meet site objectives.	Chem-1, Chem-2	5.8

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
BMP-24	PCO's will conduct as few treatments as possible, since the act of entering the area to be treated may itself have the most significant potential for impacts to wildlife. Treating an area once with an herbicide with a slightly higher potential for impact may have less overall impact than multiple applications with a lower-impact herbicide.	Chem-1	--
BMP-25	Mixing and loading of chemicals will not occur in areas with a ditch connection to aquatic features.	Chem-3	
BMP-26	Water drafting for use in VIWMP implementation will not occur on Forest Service lands.	Chem-5	
BMP-27	No storage of fuels or refuelling will occur within RCAs unless there are no other alternatives and exceptions have been agreed to advance by the Forest Service. (applicable direction WQMH BMP 2-11 and SNFPA S&G #99)		

Table 5 provides herbicide application buffer zones designed to protect Threatened, Endangered, Sensitive (TES) aquatic wildlife species (e.g., fish and amphibians) and water quality. These buffer zones were developed based on the analysis in the Biological Evaluations prepared for the VIWMP and by reviewing the following, as recommended in the National Best Management Practices for Water Quality Management on National Forest System Lands (USFS 2012):

- the characteristics of each chemical to be used (e.g., persistence, mobility, toxicity profile, and bioaccumulation potential);
- application method (e.g., type of equipment, spray pattern, droplet size, application height);
- the designated uses of water, adjacent land uses, expected rainfall, terrain, slope, soils, and geology; and
- experience in similar projects.

Table 5. Watercourse Buffers[1]

Herbicide[2]	Constructed Water Conveyance and Storage Structures[3]	Natural Watercourses[4]
Aminopyralid	25 feet	100 feet
Chlorsulfuron	25 feet	100 feet
Clopyralid	25 feet	100 feet
Glyphosate (less toxic/aquatic formulations)	10 feet	50 feet
Imazapyr	10 feet	50 feet

Sulfometuron methyl	25 feet	100 feet
Triclopyr (BEE)	300 feet	300 feet
Triclopyr (TEA)	10 feet	100 feet

[1] Buffer distances for aquatic features should be measured from the edge of the stream channel, or the edge of the special aquatic feature, or the extent of the wetted area, whichever is greater.
[2] Herbicide application within 300 feet of natural water courses will be cut-stump, hack and squirt, or direct foliar methods only.
[3] Man-made water conveyance or storage structures directly associated with engineered Project facilities, such as dams, groins, spillways, canals, flumes, weirs, etc.
[4] Natural watercourses are perennial or seasonal streams, wetlands, or intermittent channels.

5.3 WORKER AND PUBLIC SAFETY

Worker and public safety is critically important when applying herbicides and is regulated by the State of California. Appendix A includes a Human Health and Risk Assessment of the risk of herbicides to workers and the public. Site-specific protection measures are described in the table below. Appendix H includes the Pesticide Spill Prevention, Control and Countermeasure Plan for the UARP.

5.4 PROJECT-SPECIFIC RESOURCE CONSIDERATIONS

A list of project-specific resource protection measures, designed to avoid adverse effects to humans and sensitive resources resulting from project implementation, is provided in Table 6. Many of the BMPs listed above in Tables 4 and 5 also reduce the risks to humans and other biological resources.

Table 6. Human and Resource Protection Measures (PM)

General Biological Resources	
PM-1	A biologist or PCA shall conduct a pre-activity survey and flag all wetlands and associated wetland vegetation for avoidance.
PM-2	SMUD will implement annual employee awareness training (see Section 5.1) to ensure that all personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources and invasive species considerations.
PM-3	SMUD Environmental Management Staff will periodically visit some application sites to ensure resource protection measures are being followed.
PM-5	Immediately notify agencies if occurrences of special-status plants or wildlife species are detected prior to, or during, ongoing construction, operation, or maintenance of the Project (USFWS 2009).
PM-6	Each year, in compliance with USFS 4(e) Condition 38, SMUD will consult with USFS, USFWS, and CDFW to review the current list of special-status plant and wildlife species (species that are Federal Endangered or Threatened, USFS/BLM Sensitive, or on Eldorado National Forest Watch Lists) that might occur on National Forest System or BLM lands in the Project Area directly affected by Project operations.
PM-7	Sensitive resource protection priorities and strategies are expected to change over the term of the license based on climate conditions, listing/decline or delisting/recovery of individual

	species, and the potential discovery of new resources within the UARP boundary. Consequently, sensitive resource protection will be part of the yearly discussion with stakeholders during the annual review period. Protection strategies will be updated based on stakeholder recommendations, will be agreed upon by the group, and will be implemented by SMUD, as appropriate and feasible.
Botanical Resources	
PM-8	Surveys for special-status plant and invasive weed populations will be completed every five years and communicated to SMUD vegetation managers and agency stakeholders.
PM-9	SMUD will consult annually with the ENF and BLM to review the most current list of special-status plant species and invasive weeds that might occur on National Forest System or BLM lands in the Project Area directly affected by Project operations. If any previously unidentified occurrences are noted, then SMUD would manage them according to the provisions in this plan.
PM-10	Prior to herbicide or mechanical treatments, SMUD will flag and avoid occurrences of *Carex davyi, Eriogonum ovalifolium var. eximium, Githopsis pulchella ssp serpentinicola. Glyceria grandis, Streptanthus longisiliquus, and Wyethia reticulata*. If additional watch list species are discovered within the UARP appropriate protections would be developed as necessary. The herbicide exclusion buffers described in Table 7 will be applied unless expectations are approved by Forest Botanist. Flagged watchlist plant populations will be avoided during mechanical treatments as well unless approved by Forest Botanist.
PM-11	Prior to herbicide treatments or mechanical treatments, SMUD will flag occurrences of ENF-sensitive plant species, except in the case of select roadside occurrences. The herbicide exclusion buffers described in Table 7 will be applied unless exceptions for buffer distances are approved by USFS or BLM botanist. Flagged sensitive plant populations will be avoided during mechanical treatments as well unless exceptions are approved by USFS or BLM botanist.
PM-12	SMUD will invite a USFS and/or BLM botanist to visit sites where treatment has occurred near special status plants to see if resource protection measures were effective.
PM-13	SMUD will ensure the location of lava cap sites is known to any personnel performing IVM within the UARP boundary and protection buffers are employed when IVM activities occur in the vicinity of lava caps. If IVM activities must be implemented within the protection buffer, then species' occurrences will be clearly marked at the site prior to the onset of activities and only manual treatment methods will be utilized that will also be reviewed by the Forest Service during the annual meeting
PM-14	The license and 2009 USFWS Biological Opinion (BO) consider three of the federally-listed gabbro species that may occur within the UARP boundary: Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron californicum ssp. decumbens*), and Layne's butterweed (*Senecio layneae*). In accordance with the BO, SMUD will consult with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve. If IVM activities must be implemented within the protection buffer, then species' occurrences will be clearly marked at the site prior to the onset of activities. In 2021/2022 a project-specific BA that analyzes impacts of herbicide applications to the federally-listed gabbro plant species within the PHP was prepared by SMUD and reviewed by BLM and the USFWS. The USFWS concurred with the "may effect, not likely to adversely effect" finding in the BE with additional BMPs. Herbicides and mechanical methods may be used in consultation with the BLM. If herbicides are proposed, the following additional BMPs will be applied:

	• A PCA and BLM qualified pesticide applicator will be present on site to oversee herbicide application within the Preserve. • No herbicide application will occur if rain is predicted within 24 hours of the time of spraying, in accordance with BLM herbicide regulations. • SMUD will consult with BLM, USFWS, and CDFW prior to vegetation treatment to discuss proposed methods and any specific concerns (e.g., herbicide, timing, method). • Proposed application methods and timing will consider potential non-target effects (e.g., spraying prior to bloom times to minimize potential effects on native pollinators). • Application of herbicide containing glyphosate will only be used if the formulation of the product does not contain surfactant. • SMUD will ensure all herbicides and adjuvants proposed for application are approved for use by BLM. Milestone® will only be applied within the Preserve with prior approval by BLM. • Pre-emergent application of herbicides will only be used to target invasive plant populations upon approval by BLM. • Appropriate buffer distances will be determined in consultation with BLM each year prior to herbicide applications in consideration of the proposed application method and site-specific conditions (e.g., herbicide type, timing, target species, proximity to special-status species). Applications will utilize a minimum buffer of 5 feet from flagged occurrences of special-status plants unless otherwise directed after consultation. • SMUD will provide BLM reports summarizing any plant monitoring efforts occurring within the Preserve.
Invasive Weed Prevention	
PM-15	Annual effectiveness monitoring (see Section 3.2) will include monitoring of invasive weed infestations that are targeted for control or eradication. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments are needed. Where past treatments have successfully controlled or eradicated an infestation SMUD will continue to monitor the infestation annually until it is determined that treatment objectives have been met (based on expected seed bank longevity of the targeted species).
PM-16	New populations of invasive weeds will be inventoried and mapped during regularly described monitoring, and will be subsequently incorporated into the scheduled annual treatment.
PM-17	Control methods will be determined by species, location, and season to facilitate the control of invasive plants. Where feasible, control methods will occur as part of the annual maintenance work.
PM-18	Management of invasive weeds will follow the management guidelines identified by the ENF and other stakeholders.

PM-19	IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance or removal of shade and native vegetation or topsoil.
PM-20	Equipment, Staff, and Contractors involved in IVM shall be staged and begin in non-infested areas and then will move to infested areas.
PM-21	Contractors and other staff will be required to clean vehicles and equipment prior to working on the National Forest; when moving from an infested unit to a weed-free unit, vehicles and equipment will be inspected. Vehicles will be washed by contractor at their business or at SMUD's Fresh Pond facility.
PM-22	Areas in which ground-disturbing activity has occurred, and in which there is the potential to introduce invasive weeds, will be monitored for 3 years.
PM-23	Weed-free materials, including certified weed-free straw or mulch, will be used for erosion control, , with the county of origin stating the material was inspected. Local stockpiles and materials will be kept weed free with regular treatment.
PM-24	Lay-down and staging areas will be designated outside of areas infested with weeds, or the sites will be treated prior to work.
PM-25	Facility sites will be maintained to limit the introduction and spread of invasive plants; heavily used facilities will be regularly treated to prevent the spread of weeds.
PM-26	Mechanical weed trimming will not be used to manage occurrences of listed invasive weeds if those weeds have already set seeds.
PM-27	The USFS and/or BLM botanist will approve seed mixes used for erosion control or restoration.
Terrestrial Wildlife Resources	
Valley Elderberry Longhorn Beetle	
PM-28	Prior to conducting any vegetation disturbing actions in the Project Area under 3,000 feet elevation where elderberry may occur, SMUD shall survey the area to be disturbed for the presence of the beetle and its elderberry host plant and implement avoidance and protection measures, as per the USFWS 1999 Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 2009).
PM-29	If elderberry plants containing stems, measuring 1.0 inch or greater in diameter at ground level, are found in a treatment area, establish and maintain a minimum 100-foot buffer. Construction-related disturbance of the buffer areas will be minimized, and, following construction, any damaged area will be promptly restored. The Service must be consulted before any disturbances within the buffer area are considered (USFWS 1999).
PM-30	If removal or damage to elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level is necessary, SMUD will compensate for the loss. Compensation will occur either through transplanting the shrubs in accordance with USFWS 1999, through the establishment of a Service-approved conservation area, or through the purchase of Valley elderberry longhorn beetle credits at a Service-approved conservation bank (USFWS 2009).
Northern Goshawk	
PM-31	Prior to conducting any manual/mechanical vegetation treatments (e.g., chainsaw use or hazard tree removal) during the northern goshawk breeding season (15 February through 15 September), SMUD will consult the latest Goshawk PAC GIS database to determine if activities will occur within 0.25 miles of a PAC.

PM-32	If northern goshawk nests or PACs are identified in, or immediately adjacent to, the manual vegetation treatment, a no-disturbance buffer zone will be established around the nest site or activity center, as feasible. The width of the buffer zone, determined by a qualified biologist in coordination with CDFW and USFS, will be established such that the nest site will be adequately shielded from planned activities (e.g., by trees or natural topographic features), minimizing disturbance. No treatment activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). If a protective buffer zone is infeasible, construction will be postponed until after 15 August or until after the nestlings have fledged.
California Spotted Owl	
PM-33	Prior to conducting any manual/mechanical vegetation treatments (e.g., chainsaw use or hazard tree removal) during the California spotted owl breeding season (1 March through 15 August), SMUD will consult the latest Spotted owl PAC GIS database to determine if activities will occur within 0.25 miles of a PAC.
PM-34	If California spotted owl nests or activity centers are identified in, or immediately adjacent to, the manual vegetation treatment area, a no-disturbance buffer zone will be established around the nest site or activity center, as feasible. The width of the buffer zone, determined by a qualified biologist in coordination with CDFW and USFS, will be established such that the nest site will be adequately shielded from planned activities (e.g., by trees or natural topographic features), minimizing disturbance. No treatment activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). If a protective buffer zone is infeasible, construction will be postponed until after 15 August or until after the nestlings have fledged.
Bald Eagle	
PM-35	If a bald eagle nest is located within 0.25-miles of mechanical vegetation treatments that may potentially indirectly disturb nesting bald eagles during the breeding season, a no-disturbance buffer will be established in accordance with National Bald Eagle Management Guidelines (USFWS 2007) to minimize visual and auditory impacts associated with human activities. The size and shape of the buffer would vary depending on the topography and other ecological characteristics surrounding the nest site.
Aquatic Wildlife Resources	
PM-36	Watercourse buffers will be implemented as outlined in Table 5 above.
PM-37	Herbicide batching will be limited to areas more than 300 feet away from surface waters.
Worker and Public Safety	
PM-38	The California Department of Pesticide Regulation (DPR 2003 and 2004) has developed a robust Worker Protection Program around regulations; SMUD and SMUD's contractor(s) applying pesticides will use this program to comply with all State and Federal regulations.
PM-39	Signage with pertinent information will be posted at points of entry to areas being sprayed. Signs will include the date of treatment, name of pesticide, and contact information. Persons responsible for the pesticide application will notify anyone at or near the application site that the site is being treated with herbicide. Public access will be prohibited until sprays are dry.
PM-40	For clopyralid, the public will be prohibited from entry until after the application has dried. Clopyralid will only be applied via spot foliar to plants less than 2 feet tall.

PM-41	Fruit-bearing plants will not be sprayed when fruit is present.
PM-42	Crews will walk around treated vegetation, not through it.
PM-43	No more than 30 gallons of herbicide formulation will be in the treatment site at any time.
Cultural Resources	
PM-44	IVM activities shall comply with policies outlined in the UARP HPMP (2008).
PM-45	SMUD will work with the USFS to identify opportunities to use culturally important plants.
Fire Safety	
PM-46	All IVM activity will comply with the Forest Service's Project Activity Level fire protection protocols.

5.5 DESIGN CRITERIA FOR SPECIAL STATUS PLANTS

As described in Table 7, herbicide exclusion buffers will be applied in the vicinity of occurrences of ENF Sensitive and BLM special-status plant species to guard against effects from both drift and runoff. These distances are considered maximum buffers and reductions in buffers will be discussed in consultation with USFS; A USFS or BLM botanist, will determine if actual distances may be adjusted, based on species, temporal, or site-specific considerations. Methods will be used to avoid sensitive plant populations - including flagging for avoidance and seasonal treatments to occur after sensitive annual plants have set seed. For selected roadside occurrences (See Appendix G), SMUD will not flag Sensitive plant occurrences for avoidance. Flagging, buffering and avoiding treatment at these locations encourages the proliferation of invasive plants and potentially creates an unsafe situation by increasing fire danger and the chances for vehicle collisions.

Table 7. Herbicide Exclusion Buffers around ENF Sensitive Plants.

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]
Aminopyralid	200
Chlorosulfuron	100
Clopyralid	50
Glyphosate	50
Imazapyr	100
Sulfometuron methyl	100
Triclopyr BEE	200

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]
Triclopyr TEA	50

[1] Measured from exterior edge of ENF Sensitive plant occurrence; exceptions for buffer distances can be made when approved by USFS or BLM botanist.

5.6 AQUATIC INVASIVE WEEDS

FERC license USFS 4(e) Condition No. 39 and SWRCB, WQC Certification Condition 26 require that SMUD include an adaptive management element to implement methods for prevention of aquatic invasive weeds, as appropriate, in order to protect native aquatic species. These actions may include, but are not limited to, the following:

1. public education and signing of public boat access,
2. preparation of an Aquatic Plant Management Plan approved by the Forest Service, and in consultation with other agencies, and
3. boat cleaning stations at boat ramps for the removal of aquatic invasive weeds.

There are currently no known aquatic weed infestations within the UARP boundary. SMUD currently monitors the major recreational reservoirs for aquatic invasive invertebrates. SMUD will perform presence/absence surveys for aquatic weed species of concern, in conjunction with the existing invertebrate monitoring effort at boat ramps. If the presence of an invasive aquatic weed is confirmed, SMUD will consult with stakeholders to determine follow-up actions. Additionally, SMUD will provide new/updated signage (using agency-standard signs) related to aquatic weeds at popular boat launch sites within the UARP boundary. Should conditions change, SMUD will consider implementing additional aquatic weed prevention strategies, as recommended by the stakeholders.

5.7 GABBRO SOILS ENDEMIC PLANTS OF THE PINE HILL PRESERVE

Gabbro plants are most often associated with the Rescue soil series, which is well-drained and underlain by gabbrodiorite (granular igneous) rocks, on the Pine Hill formation in western El Dorado County. A Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills includes management objectives for six plant species that occur exclusively or primarily on gabbro soils of the Pine Hill formation in chaparral and woodland communities (USFWS 2002). The six species are state or federally protected and include Stebbins' morning-glory (*Calystegia stebbinsii*), Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron californicum ssp. decumbens*), El Dorado bedstraw (*Galium californicum* spp. *sierrae*), Layne's butterweed (*Senecio layneae*), and El Dorado mule-ears (*Wyethia reticulata*).

The license and 2009 BO consider three of the federally-listed gabbro species that may occur within the UARP boundary:

1. The endangered Pine Hill ceanothus;

2. The endangered Pine Hill flannelbush; and

3. The threatened Layne's butterweed.

The USFWS determined that O&M of UARP facilities under the license is not likely to jeopardize the continued existence of these three species.

SMUD will ensure the location of gabbro species is known to any personnel performing vegetation management within the UARP boundary and protection buffers are employed when IVM activities occur in the vicinity. In accordance with the BO, SMUD is required to consult with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve. In 2021-2022 a project-specific BA that analyzes impacts of herbicide applications to the federally-listed gabbro plant species within the PHP was prepared by SMUD, reviewed by BLM and CDFW, and submitted to the USFWS for informal consultation (Appendix I). On May 5, 2022 the USFWS concurred with the *"may affect, not likely to adversely affect"* finding in the BA with additional BMPs (Appendix J). SMUD will implement these additional protection measures, as listed in PM-14 of Table 6 above, when utilizing herbicide applications in the PHP.

6.0 REFERENCES

Bakke, David. 2001. A review and Assessment of the Results or Water Monitoring for Herbicide Residues for the Years 1991 to 1999 USFS Region Five. February.2001

Bakke, David. 2002 and updated 2007. Analysis of Issues Surrounding the Use of Spray Adjuvants With Herbicides. USDA Forest Service.

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Bramble, W.C., and W.R. Byrnes. 1996. Integrated vegetation management of an electric utility right-of-way ecosystem. Down to Earth 51(1): 29-34.

CalFlora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The CalFlora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: Nov 11, 2015).

California Department of Fish and Wildlife. 2015. Biogeographic Information and Observation System/California Natural Diversity Database (BIOS/CNDDB). Accessed: November.

California Department of Food and Agriculture. 2015. Pest Health and Prevention Services.

California Noxious Weeds. Available at https://www.cdfa.ca.gov/plant/ipc/encycloweedia/weedinfo/winfo_table-sciname.html Accessed: September.

California Department of Pesticide Regulation; Pesticide Safety Information Series, September 2003 and 2004, www.dpr.ca.gov. PSIS N-2. Storing, Moving and Disposing of Pesticides in Non-Agricultural Settings, PDF (Rev. 09/15, 345 kb) (En Español, 242 kb) (In Punjabi, 620 kb)

California Invasive Plant Council (Cal-IPC). 2012. Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.). Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA. Available at http://www.cal-ipc.org.

____. 2015a. Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management. Cal-IPC Publication 2015-1. California Invasive Plant Council, Berkeley, CA. Available at http://www.cal-ipc.org

____. 2015b. Invasive Plant Inventory. Available at http://www.cal-ipc.org/ip/inventory/ Accessed: November.

____. 2015c. Regional Programs for Weed-Free Aggregate. Available at http://www.cal-ipc.org/ip/prevention/weedfreegravel.php Accesses: November.

California Native Plant Society (CNPS), Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Available at http://www.rareplants.cnps.org Accessed: November.

California Regional Water Quality Control Board. Basin Plan. Available at http://www. www.waterboards.ca.gov.

Center for Sierra Nevada Conservation. 2014. Project Description for Grants and Cooperative Agreement Program Restoration Application. March 3.

El Dorado County Invasive Weed Management Group (EDCIWMG). 2010. Memorandum of Understanding.

_________. 2015. A Builder and Contractor's Guide to Preventing the Introduction and Spread of Invasive Weeds. Available at http://ucanr.org/edc Accessed: October.

Federal Energy Regulatory Commission. 2014. Order Issuing New License for Sacramento Municipal Utility District Upper America River Hydroelectric Project No.2101. Project No. 2101-084. July 23.

Natural Resources Conservation Service. National Plant Database National Symbol Protocol. Available at http://www.nrcs.org.

North American Weed Management Association. Weed-Free Aggregate Program. Sierra Nevada Region. Available at http://www.cal-ipc.org/ip/prevention/weedfreegravel.php

Sacramento Municipal Utility District (SMUD). 2007. Relicensing Settlement Agreement for the Upper American River Project and Chili Bar Hydroelectric Project. Sacramento Municipal Utility District, Sacramento, CA.

____. 2008. Final Historic Properties Management Plan, Version 2. October.

____. 2012. Transmission Line Integrated Vegetation Management Plan for the Upper American River Project (UARP). FERC Project No. P-2101. November.

____. 2015a. Facilities Management Plan. FERC Project No. 2101. June.

____. 2015b. Transportation and Trails System Management Plan for the UARP. U.S. Bureau of Land Management (BLM). 2008. Integrated Vegetation Management. Handbook H1740-2. March 25.

____. 2015. Pine Hill Preserve. Available at http://www.pinehillpreserve.org/ Accessed: October.

____. 2022. Biological Evaluation/Biological Assessment for Botanical Resources. Plan to use herbicides for vegetation management within SMUD's Transmission ROW at Pine Hill Preserve. February.

U.S. Department of Agriculture (USDA). 2001and 2004. Forest Service, Pacific Southwest Region. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement and Record of Decision, USDA Forest Service, Pacific Southwest Region, Vallejo, CA. 138p.

____.2011. R5 FSH 2509.22 - Soil and Water Conservation Handbook. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5399662.pdf

____. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. April.

_____ 2012. Water Quality Management for Forest System Lands in California, Best Management Practices. http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5395282

____. 2013. Forest Service Eradication and Control of Invasive Plants. Environmental Assessment. May.

____. 2014. Eldorado National Forest, Standard Road Maintenance Specifications for Roads. March.

____. 2015a. Forest Service Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG). Available at http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/. Accessed: November.

____. 2015b. Forest Service Invasive Plant list for the Eldorado National Forest. March 10.

U.S. Fish and Wildlife Service (USFWS). 1999. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project No. 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

______. 2002. Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills. August.

_____. 2007. National bald eagle management guidelines.

____. 2009. Biological Opinion for the Upper American River Project (FERC 2101). September 28.

____. 2015. Information for Planning and Conservation (IPaC) Trust Resource Report for SMUD UARP VIWMP. Generated: November.

Appendix A
Human Health Risk Assessment for the Upper American River Project Vegetation and Invasive Weed Management Plan

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

The purpose of this analysis is to assess the risks to human health of using herbicides prescribed in the Sacramento Municipal Utility District (SMUD), Upper American River Project (UARP), Vegetation and Invasive Weed Management Plan (VIWMP). The herbicides being evaluated include: aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr, sulfometuron methyl, and triclopyr (triethylamine salt (TEA) and butoxy-ethyl-ester (BEE). The prescribed surfactant will be a modified seed oil surfactant/diluent (Competitor). These herbicides have been approved by the United States Environmental Protection Agency (EPA) and are appropriate for use within the UARP due to their environmental compatibility combined with their efficacy in treating unwanted vegetation.

As described in the VIWMP, the use of herbicides is an important component of the Integrated Vegetation Management (IVM) program designed for maintenance of UARP hydroelectric facilities. Unwanted and overgrown vegetation can interfere with operation and maintenance of facilities involved in the generation, transmission, and distribution of electricity. Effective vegetation management within the Project area is essential for the safe, reliable and economical operation of the hydroelectric project. The use of herbicides is needed to improve safety and reliability of the facilities and to reduce the possibility of catastrophic wildfires.

This risk assessment examines the potential health effects on all groups of people who might be exposed to any of the eight herbicides and surfactants that could be used in treating the vegetation within UARP project boundary and along designated access roads. Those humans potentially at risk fall into two groups: workers and members of the public. Workers include applicators, supervisors, and other personnel directly involved in the application of herbicides. The public includes other forest workers, forest visitors, and nearby residents who could be exposed through the drift of herbicide spray droplets, through contact with sprayed vegetation, or by eating, or placing in the mouth, food items or other plant materials, such as berries or shoots growing in or near forests, by eating game or fish containing herbicide residues, or by drinking water that contains such residues.

A diverse portfolio of herbicides is needed to allow for greater adaptability, environmental compatibility, and efficacy. These products have toxicological profiles that are considered environmentally compatible for use within the UARP. The hazards associated with using these herbicides have been evaluated via comprehensive reviews of available toxicological studies. These reviews are presented as a series of product specific risk assessments completed by Syracuse Environmental Research Associates (SERA) under contract with the United States Forest Service and are incorporated by reference into this risk assessment. Copies of these risk assessments are included in the project record.

Below are project risk assessments for each herbicide prescribed. Product specific work sheets developed by the Forest Service—in cooperation with the SERA; Spreadsheets

(WorksheetMaker, version 6.01.16) were prepared for each herbicide (see Table 1). Tables 19 through 25 below provide Hazard Quotients for various scenarios and exposures. The USDA Forest Service risk assessments and the WorksheetMaker can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml. Product labels and material safety data sheets (MSDS's) can be provided upon request.

Table 1. Comparison of the Proposed Chemicals and Application Rates

Chemical	Proposed Action; Risk assessment
	Proposed Maximum Application Rate
Aminopyralid	.011 a.e. lbs./acre
Chlorsulfuron	.05 ai lb./acre
Clopyralid	0.14 a.e. lbs./acre
Glyphosate	2 a.e. lbs./acre
Imazapyr	.33 a.e. lbs./acre
Sulfometuron Methyl	.14 ai lbs./acre
Triclopyr (TEA)	2 a.e. lbs./acres
Triclopyr (BEE)	2 a.e. lbs./acre

Application rate units: acid equivalent pounds per acre (a.e. lbs./acre)

Each compound has unique characteristics with specific intent for use within the VIWMP Program. Project-specific protection measures and Best Management Practices (BMPs) were prepared for this project (see Section 5 of the VIWMP, Tables 6 and 7). The BMPs and protection measures are designed to minimize risks to human health and the environment.

Specific recommendations for treatments in each area within the UARP will be determined by licensed Pest Control Advisors. The site-specific recommendations will prescribe the appropriate combination of herbicides and will consider various factors such as population density, presence of native and sensitive plants, and proximity to other sensitive resources.

1.1 SUMMARY OF RISK AND EXPOSURE

The application of aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr, sulfometuron methyl and triclopyr (TEA and BEE formulations) proposed as part of the VIWMP is expected to present a low risk to human health and safety. Based on the available information, the addition of the proposed surfactant and dye, would also pose a low risk to human health and safety. The protection measures and BMPs are designed to reduce the level of exposure and associated risk to the health and safety of workers and members of the public. This is based on the analysis included in the SERA risk assessments (SERA WorkbookMaker, version 6.01.16 2017), as well as the project-level risk characterization described in this appendix, which was conducted using the specific chemicals, application rates, and volumes proposed for controlling unwanted vegetation within the UARP area and access roads.

2.0 RISK ASSESSMENTS

The USDA Forest Service has developed a process for analyzing the risk associated with the use of a specific herbicide. Each of the herbicides described below has undergone a detailed toxicological analysis with application criteria. In addition to the general assessment, each herbicide has a separate spreadsheet which allows for project-specific analyses. The purpose of the analysis is to assess the risk to human health and the environment from the use of various herbicides. These assessments provide a method for analyzing the potential health effects of workers and members of the public who might be exposed to the herbicides. Exposure scenarios are also explained in the risk assessment reports for each of the herbicides.

The SERA spreadsheets have been developed over several years and are continually revised and improved to provide the best possible analysis. The assessment capabilities are not the same for each compound. In each scenario, the best and most plausible scenarios are evaluated. The project-specific spreadsheets consider risk human risk associated with this project.. The assessments compare a potential exposure dose with the established daily reference dose (RfD) established by the U.S. EPA. This is expressed in the form of a hazard quotient (HQ). The RfD is defined as the level of exposure at or below which no acute or chronic health effects are expected to occur. The hazard quotient is the project potential exposure dose and is expressed as ratio of exposure to the RfD. Project-specific evaluations of each herbicide were completed. Each herbicide-specific spreadsheet analyses four human risk potentials. The following is the result and discussion of the evaluation of the project-specific herbicides.

2.1 EXPOSURE ANALYSIS

This exposure assessment examines the potential health effects to two groups of people that are most likely to be exposed to aminopyralid, chlorsulfuron clopyralid, glyphosate, imazapyr, sulfometuron methyl and triclopyr (TEA and BEE formulations): workers and members of the public. Workers include applicators, supervisors, and other personnel directly involved in the application of herbicides. The public includes other USDA Forest Service personnel, visitors, or nearby residents who could be exposed through herbicide drift, contact with sprayed vegetation, by drinking water that contains herbicide residue, or by eating contaminated vegetation (such as berries or foliage), game, or fish.

In these analyses, data are displayed for three different exposure scenarios: typical, lower, and upper. The upper level represents a conservative estimate of a worst-case scenario resulting from the highest application rate, lowest dilution rate, and largest number of acres treated per day. This approach is used to encompass as broadly as possible the range of potential exposures. The most important factor in exposure and the evaluation is the impact of application volume and the subsequent concentration mixed in the field. All risk assessments consider the range of application volumes, field concentration, and subsequent potential exposures

The UARP includes electric transmission rights-of-way (ROWs), hydro-electric facilities, and access roads that are within the Eldorado National Forest. All treatment areas are designed to be no closer than 1/2 mile from any permanent human habitation. Any exposure due to spray drift from this type of herbicide application to residents living beyond the minimum ¼ mile limit from the treatment site would be negligible. Facilities (potential treatment sites) have limited access and minimal public use, which will further reduce exposure potential as well. Much of the area is used for recreation, which could include activities such as hiking, berry picking, or plant gathering. During these activities, the public could pass close to or through these sites. Treatments will be made at a time when much of the activities would not occur. Potential risk from exposure is minimal and not expected to pose a significant risk to workers or to the public. According to recent work completed by the California Department of Pesticide Regulation (DPR), exposure to native plant material collectors can be essentially eliminated if they remain at least 100 feet from the treated areas. In the DPR study (published 2001), herbicides were detected in 19 of 227 (8%) samples taken outside both aerial and ground-based herbicide application units, and the majority of the positive samples (90%) were within 70 feet of the edge of the sampled unit. All positive samples had concentrations of herbicides less than or equal to 2.68 parts per million (Goh 1999). These studies did not determine whether these detected amounts were due to drift or to application error. These studies suggest that with ground-based applications, negligible amounts of off- site movement due to drift would be expected beyond 75 to 100 feet from the treatment area. Selective spot applications with backpacks should further reduce the potential for off-target movement.

Following the above procedures, using the same non-site-specific data as used in the SERA Risk Assessments (SERA 2017a-j), and based on site-specific herbicide-use levels, doses were calculated for potentially exposed workers and members of the public and are displayed in Product-specific Risk Assessment Worksheets (available upon request). Dose estimates are based on actual field studies of worker exposures and public dose estimates have been extrapolated from the worker exposure data. Exposure scenarios for workers include exposure during normal operations, as well as four accident scenarios.

Considering the operational constraints, protection measures and BMPs that were developed for the VIWMP, members of the general public should not be exposed to significant levels of herbicide. Nonetheless, several exposure scenarios for each herbicide have been developed for the general public. These scenarios consider incidents that might occur although the probability is remote. In these scenarios, conservative assumptions are used to show the effects of high levels of exposure. Exposure scenarios developed for the general public includes both acute exposure and longer-term or chronic exposure. A majority of the acute exposure scenarios are accidental and they assume that an individual is exposed to the compound either during or shortly after its application. Using MS Excel spreadsheets developed by SERA, the exposure risks were calculated using proposed project application rates and herbicide solution concentrations.

2.2 SUMMARY OF WORKER EXPOSURES

The following tables provide a summary of the general and accidental exposure scenarios calculated for workers.

Table 2. Summary of Worker Exposure Scenarios for Aminopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.00144375	0.0000495	.0088
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	1.2408E-07	2.385E-08	6.864E-07
Contaminated Gloves, 1 hour	7.4448E-06	0.000001431	0.000041184
Spill on hands, 1 hour	2.91389E-05	4.37549E-06	0.000210936
Spill on lower legs, 1 hour	7.18066E-05	1.07825E-05	0.000519807

*Analyzed at the Maximum Application Rate of 0.11 a.e. lbs./Acre.

Table 3. Summary of Worker Exposure Scenarios for Chlorsulfuron

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0000672	0.00000144	0.0005184
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	1.334E-07	3.634E-08	5.244E-07
Contaminated Gloves, 1 hour	0.000008004	2.1804E-06	0.000031464
Spill on hands, 1 hour	5.01075E-06	7.72786E-07	3.28172E-05
Spill on lower legs, 1 hour	1.23479E-05	1.90437E-06	8.0871E-05

*Applied at the Maximum Application Rate of 0.05 a.i. lbs./Acre.

Table 4. Summary of Worker Exposure Scenarios for Clopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0018375	0.000063	0.0112
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	2.856E-07	5.896E-08	0.00000143
Contaminated Gloves, 1 hour	0.000017136	3.5376E-06	0.0000858
Spill on hands, 1 hour	5.07872E-05	8.36106E-06	0.000326853
Spill on lower legs, 1 hour	0.000125154	2.0604E-05	0.000805459

*Applied at the Maximum Application Rate of 0.14 a.e. lbs./Acre.

Table 5. Summary of Worker Exposure Scenarios for Glyphosate

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.02625	0.0009	0.16
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0000036	7.104E-07	0.00002016
Contaminated Gloves, 1 hour	0.000216	0.000042624	0.0012096
Spill on hands, 1 hour	0.000472223	0.0001198	0.001535232
Spill on lower legs, 1 hour	0.001163693	0.000295222	0.003783251

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 6. Summary of Worker Exposure Scenarios for Imazapyr: chopper

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.00433125	0.0001485	0.0264
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.00005488	0.0000224	0.0001738
Contaminated Gloves, 1 hour	0.0032928	0.001344	0.010428
Spill on hands, 1 hour	0.000517156	0.000168923	0.002196174
Spill on lower legs, 1 hour	0.001274419	0.000416274	0.005412

*Applied at the Maximum Application Rate of .33 a.e. lbs./Acre.

Table 7. Summary of Worker Exposure Scenarios for Sulfometuron Methyl

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0018375	0.000063	0.0112
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	8.568E-07	0.000000268	0.00000286
Contaminated Gloves, 1 hour	0.000051408	0.00001608	0.0001716
Spill on hands, 1 hour	1.77388E-05	3.08729E-06	0.000103437
Spill on lower legs, 1 hour	4.37136E-05	7.60795E-06	0.000254899

*Applied at the Maximum Application Rate of 0.14 a.i. lbs./Acre.

Table 8. Summary of Worker Exposure Scenarios for Triclopyr (TEA)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day
General Exposure (dose in mg/kg/day)			
Backpack application	0.02625	0.0009	0.16
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0000576	0.0000192	0.0001728
Contaminated Gloves, 1 hour	0.003456	0.001152	0.010368
Spill on hands, 1 hour	0.001013314	0.000276439	0.003988413
Spill on lower legs, 1 hour	0.002497095	0.000681224	0.009828589

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 9. Summary of Worker Exposure Scenarios for Triclopyr (BEE)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.05075	0.00258	0.624
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0312	0.012672	0.0832
Contaminated Gloves, 1 hour	1.872	0.76032	4.992
Spill on hands, 1 hour	0.00356567	0.001105257	0.012391347
Spill on lower legs, 1 hour	0.008786831	0.002723668	0.03053582

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

2.3 SUMMARY OF GENERAL PUBLIC EXPOSURES

The following tables provide a summary of the exposure scenarios calculated for members of the general public.

Table 10.Summary ofPublic Exposure Scenarios for Aminopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.10E-03	1.65E-04	7.97E-03
Direct Spray, feet and lower legs, woman	1.11E-04	1.66E-05	8.01E-04
Water Consumption, spill, child	5.63E-03	2.76E-04	1.88E-02
Fish Consumption, spill, adult male	1.69E-04	1.36E-05	3.76E-04
Fish Consumption, spill, subsistence populations	8.24E-04	6.62E-05	1.83E-03
Dermal Exposure, contaminated vegetation	1.04E-04	1.96E-05	5.53E-04

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Contaminated Fruit	1.29E-03	5.91E-04	2.05E-02
Contaminated Vegetation	1.78E-02	1.24E-03	1.49E-01
Swimming, one hour, adult female	2.73E-09	1.31E-11	6.80E-08
Water Consumption, non-spill, child	8.27E-04	1.01E-05	7.44E-03
Consumption of Fish, non-spill, adult male	2.48E-05	4.97E-07	1.49E-04
Consumption of Fish, non-spill, subsistence populations	1.21E-04	2.42E-06	7.26E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.75E-04	9.93E-05	5.25E-03
Contaminated Vegetation	3.79E-03	2.08E-04	3.80E-02
Consumption of Water, adult male	1.26E-04	2.20E-06	9.81E-04
Consumption of Fish, adult male	6.29E-07	1.57E-08	4.09E-06
Consumption of Fish, subsistence population	5.09E-06	1.27E-07	3.31E-05

* Maximum Application Rate of 0.11 a.e. lbs./Acre

Table 11. Summary of General Public Exposure Scenarios for Chlorsulfuron

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.89E-04	2.92E-05	1.24E-03
Direct Spray, feet and lower legs, woman	1.90E-05	2.93E-06	1.25E-04
Water Consumption, spill, child	2.48E-03	1.20E-04	8.11E-03
Fish Consumption, spill, adult male	7.43E-05	5.89E-06	1.62E-04
Fish Consumption, spill, subsistence populations	3.62E-04	2.87E-05	7.91E-04
Dermal Exposure, contaminated vegetation	1.66E-05	3.23E-06	8.21E-05
Contaminated Fruit	5.64E-04	2.58E-04	8.96E-03
Contaminated Vegetation	7.78E-03	5.40E-04	6.48E-02
Swimming, one hour, adult female	2.92E-09	1.00E-10	1.75E-08
Water Consumption, non-spill, child	3.61E-04	2.20E-05	1.08E-03
Consumption of Fish, non-spill, adult male	1.08E-05	1.08E-06	2.17E-05
Consumption of Fish, non-spill, subsistence populations	5.28E-05	5.28E-06	1.06E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.38E-04	1.09E-04	3.77E-03
Contaminated Vegetation	3.27E-03	2.27E-04	2.73E-02
Consumption of Water, adult male	8.23E-07	9.60E-08	1.48E-06
Consumption of Fish, adult male	6.17E-09	1.03E-09	9.26E-09
Consumption of Fish, subsistence population	5.21E-08	8.68E-09	7.81E-08

Maximum application rate at .05 ai. lb./ac

Table 12. Summary of Public Exposure Scenarios for Clopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.92E-03	3.16E-04	1.23E-02
Direct Spray, feet and lower legs, woman	1.93E-04	3.17E-05	1.24E-03
Water Consumption, spill, child	7.17E-03	3.49E-04	2.35E-02
Fish Consumption, spill, adult male	2.15E-04	1.72E-05	4.70E-04
Fish Consumption, spill, subsistence populations	1.05E-03	8.37E-05	2.29E-03
Dermal Exposure, contaminated vegetation	1.85E-04	3.85E-05	8.85E-04
Contaminated Fruit	1.65E-03	7.53E-04	2.61E-02
Contaminated Vegetation	2.27E-02	1.58E-03	1.89E-01
Swimming, one hour, adult female	1.26E-09	8.13E-11	1.68E-08
Contaminated Water, non-spill, child	2.11E-04	3.21E-05	1.11E-03
Consumption of Fish, non-spill, adult male	6.32E-06	1.58E-06	2.21E-05
Consumption of Fish, non-spill, subsistence populations	3.08E-05	7.70E-06	1.08E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	6.64E-04	2.42E-04	1.38E-02
Contaminated Vegetation	9.15E-03	5.07E-04	9.95E-02
Consumption of Water, adult male	2.80E-05	2.80E-06	6.24E-05
Consumption of Fish, adult male	1.40E-07	2.00E-08	2.60E-07
Consumption of Fish, subsistence population	1.13E-06	1.62E-07	2.11E-06

*Applied at the Maximum Application Rate of 0.14 a.e. lbs./Acre.

Table 13. Summary of Public Exposure Scenarios for Glyphosate

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.78E-02	4.53E-03	5.80E-02
Direct Spray, feet and lower legs, woman	1.79E-03	4.55E-04	5.83E-03
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.17E-03	9.35E-05	2.60E-03
Fish Consumption, spill, subsistence populations	5.70E-03	4.56E-04	1.27E-02
Dermal Exposure, contaminated vegetation	2.19E-03	6.98E-04	5.31E-03
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	8.71E-09	2.54E-10	2.76E-07
Water Consumption, non-spill, child	1.65E-03	1.19E-04	1.87E-02
Consumption of Fish, non-spill, adult male	1.89E-05	2.23E-06	1.42E-04

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Consumption of Fish, non-spill, subsistence populations	9.20E-05	1.09E-05	6.94E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	3.76E-03	1.72E-03	5.97E-02
Contaminated Vegetation	5.18E-02	3.60E-03	4.32E-01
Consumption of Water, adult male	1.09E-05	3.52E-06	3.98E-04
Consumption of Fish, adult male	2.06E-08	9.55E-09	6.30E-07
Consumption of Fish, subsistence population	1.67E-07	7.74E-08	5.10E-06

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

Table 14. Summary of Public Scenarios for Imazapyr: chopper

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.95E-02	6.38E-03	8.30E-02
Direct Spray, feet and lower legs, woman	1.96E-03	6.41E-04	8.34E-03
Water Consumption, spill, child	4.18E-02	2.08E-03	1.69E-01
Fish Consumption, spill, adult male	6.28E-04	5.13E-05	1.69E-03
Fish Consumption, spill, subsistence populations	3.06E-03	2.50E-04	8.22E-03
Dermal Exposure, contaminated vegetation	8.19E-04	3.30E-04	2.11E-03
Contaminated Fruit	3.88E-03	1.77E-03	6.16E-02
Contaminated Vegetation	5.35E-02	3.71E-03	4.46E-01
Swimming, one hour, adult female	9.76E-08	2.20E-11	2.49E-06
Contaminated Water, non-spill, child	4.96E-04	1.36E-07	9.68E-03
Consumption of Fish, non-spill, adult male	7.45E-06	3.35E-09	9.68E-05
Consumption of Fish, non-spill, subsistence populations	3.63E-05	1.63E-08	4.72E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	1.63E-03	4.20E-04	2.98E-02
Contaminated Vegetation	2.25E-02	8.79E-04	2.15E-01
Consumption of Water, adult male	6.60E-05	1.98E-08	1.36E-03
Consumption of Fish, adult male	1.65E-07	7.07E-11	2.83E-06
Consumption of Fish, subsistence population	1.34E-06	5.73E-10	2.29E-05

*Applied at the Maximum Application Rate of .33 a.e. lbs./Acre.

Table 15. Summary of Public Exposure Scenarios for Sulfometuron methyl

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	6.70E-04	1.17E-04	3.91E-03
Direct Spray, feet and lower legs, woman	6.73E-05	1.17E-05	3.93E-04
Water Consumption, spill, child	7.17E-03	3.49E-04	2.35E-02
Fish Consumption, spill, adult male	6.46E-04	5.15E-05	1.41E-03
Fish Consumption, spill, subsistence populations	3.15E-03	2.51E-04	6.87E-03
Dermal Exposure, contaminated vegetation	6.50E-05	1.42E-05	2.87E-04
Contaminated Fruit	1.65E-03	7.53E-04	2.61E-02
Contaminated Vegetation	2.27E-02	1.58E-03	1.89E-01
Swimming, one hour, adult female	1.89E-10	4.44E-12	9.61E-09
Water Consumption, non-spill, child	1.05E-05	3.85E-07	3.16E-04
Consumption of Fish, non-spill, adult male	9.48E-07	5.69E-08	1.90E-05
Consumption of Fish, non-spill, subsistence populations	4.62E-06	2.77E-07	9.24E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.63E-04	1.20E-04	4.18E-03
Contaminated Vegetation	3.63E-03	2.52E-04	3.02E-02
Consumption of Water, adult male	1.60E-07	2.80E-08	3.36E-07
Consumption of Fish, adult male	5.60E-09	1.40E-09	9.80E-09
Consumption of Fish, subsistence population	4.54E-08	1.13E-08	7.94E-08

Maximum application rate at .14 ai. lb./ac

Table 16. Summary ofPublic Scenarios for Triclopyr TEA

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	3.83E-02	1.04E-02	1.51E-01
Direct Spray, feet and lower legs, woman	3.85E-03	1.05E-03	1.51E-02
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	4.68E-03	1.61E-03	1.36E-02
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	3.80E-08	5.28E-12	6.84E-06
Contaminated Water, non-spill, child	4.51E-04	9.17E-08	5.41E-02
Consumption of Fish, non-spill, adult male	8.13E-07	2.71E-10	6.50E-05

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Consumption of Fish, non-spill, subsistence populations	3.96E-06	1.32E-09	3.17E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	9.14E-03	2.78E-03	2.51E-01
Contaminated Vegetation	3.22E-02	9.38E-04	6.39E-01
Consumption of Water, adult male	5.71E-05	8.00E-12	4.11E-03
Consumption of Fish, adult male	1.71E-08	3.43E-15	1.03E-06
Consumption of Fish, subsistence population	1.39E-07	2.78E-14	8.33E-06

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 17. Summary of Public Scenarios for Triclopyr BEE

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.35E-01	4.18E-02	4.68E-01
Direct Spray, feet and lower legs, woman	1.35E-02	4.20E-03	4.70E-02
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	1.61E-02	6.36E-03	3.96E-02
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	2.75E-06	5.23E-10	4.12E-04
Contaminated Water, non-spill, child	6.02E-05	1.38E-08	6.77E-03
Consumption of Fish, non-spill, adult male	1.08E-07	4.06E-11	8.13E-06
Consumption of Fish, non-spill, subsistence populations	5.28E-07	1.98E-10	3.96E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	9.14E-03	2.78E-03	2.51E-01
Contaminated Vegetation	2.13E-02	3.97E-04	6.39E-01
Consumption of Water, adult male	1.14E-07	8.00E-13	4.80E-06
Consumption of Fish, adult male	3.43E-11	3.43E-16	1.20E-09
Consumption of Fish, subsistence population	2.78E-10	2.78E-15	9.72E-09

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

Table 18. Summary of Public Scenarios for Triclopyr (TCP)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	N/A		
Direct Spray, feet and lower legs, woman	N/A		
Water Consumption, spill, child	4.36E-04	8.53E-06	2.49E-03
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	N/A		
Contaminated Fruit	3.35E-03	1.53E-03	5.31E-02
Contaminated Vegetation	4.61E-02	3.20E-03	3.84E-01
Swimming, one hour, adult female	7.13E-06	4.96E-11	3.55E-04
Contaminated Water, non-spill, child	1.35E-04	9.17E-10	6.32E-03
Consumption of Fish, non-spill, adult male	2.44E-07	2.71E-12	7.58E-06
Consumption of Fish, non-spill, subsistence populations	1.19E-06	1.32E-11	3.70E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.74E-03	9.81E-04	5.15E-02
Contaminated Vegetation	1.24E-02	3.60E-04	2.31E-01
Consumption of Water, adult male	7.52E-06	2.75E-13	4.51E-04
Consumption of Fish, adult male	8.57E-10	5.14E-17	3.43E-08
Consumption of Fish, subsistence population	6.94E-09	4.17E-16	2.78E-07

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

2.4 RISK ANALYSIS

This risk analysis was accomplished by comparing the dose levels estimated in the exposure analysis combined with the toxic effect levels described in the hazards analysis.

The potential risks associated with the use of herbicides prescribed for this project are minimal. Project specific BMP's further insure that risks will be minimized.

2.4.1 Aminopyralid (Milestone)

2.4.1.1 Workers

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of Milestone in the VIWMP is not expected to result in an exposure that would approach a level of concern.

2.4.1.2 Public

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of Milestone in the VIWMP is not expected to result in an exposure that would approach a level of concern.

2.4.2 Chlorsulfuron (Telar XP)

2.4.2.1 Workers

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of chlorsulfuron in the plan is not expected to result in an exposure that would approach a level of concern.

2.4.2.2 Public

It is deemed unlikely that the public will be exposed to chlorsulfuron at a level of concern. All the acute exposure scenarios are below a level of concern. Of the longer term (chronic) scenarios, the long-term consumption of contaminated vegetation after application of the highest dose yields a hazard quotient that is greater than 1 (HQ=1.4). The scenario for the longer-term exposure to contaminated vegetation is also an extremely conservative assumption. The individual would need to be in contact with a considerable amount of the vegetation for an extended period on an annual basis.

2.4.3 Clopyralid (Transline)

Clopyralid as Transline will be prescribed and applied as one component of the plan. Certain scenarios may result in exposures that exceed levels of concern.

2.4.3.1 Workers

In the projected scenarios, hazard quotients for all potential exposures are well below a level of concern. It is expected that actual exposure levels will be below a level of concern> BMPS and protection measures and BMPs will further mitigate against exposure.

2.4.3.2 Public

No scenarios exceed a level of concern. There is elevated risk that would result from a prolonged exposure to treated vegetation and the consumptions of contaminated fruit by an adult female. Significant exposure would require repeated exposure to vegetation immediately following application along with eating considerable fruit contaminated from annual applications to the same site.

Hexochlorobenzene

Hexochlorobenzene is a contaminant found in clopyralid and decomposition metabolites. It is recognized as a potential carcinogen. Therefore, human health risks must be assessed and taken into consideration. The EPA has established an RfD of .0008 mg/kg/day for this compound. Hexochlorobenzene is present in very small amounts in clopyralid: 2.5 ppm per unit of measure. The proposed rate of application for clopyralid is .14 pound AE/acre. The subsequent rate of Hexochlorobenzene is 2.5/1,000,000 x.14 or 3 x10^{-7}. This rate was used for the exposure assessments. There is no risk to aquatic or terrestrial wildlife and plants. Only human health assessments were completed.

2.4.4 Glyphosate (Aquamaster/Roundup Custom)

There are multiple risk assessment work sheets available for glyphosate. Two worksheets were used to complete this assessment. One worksheet assesses back pack applications using the more toxic formulation of Roundup which includes the surfactant polyethoxylated tallow amine (POEA). This sheet was chosen because it is the latest version and has the most accurate drift scenarios included. Also, there are terrestrial wildlife expose scenarios not included in other worksheets. The other sheet assesses the use of the less toxic formulation without surfactant. Surfactants added are considered minimally non-toxic, very different from POEA.This sheet includes the more accurate aquatic exposure assessments with the more accurate toxicity values. The more toxic formulation with POEA will not be use in this project. The least toxic formations will be prescribed. This will further mitigate risks associated with the use of Glyphosate.

2.4.4.1 Workers

Potential risk associated with the use of glyphosate is minimal. Potential exposure across rates and scenarios is well below the level of concern. It is anticipated that exposure will not reach a level of concern.

2.4.4.2 Public

Hazard quotients are, for the most part, well below a level of concern. One exposure scenario results in hazard quotients for accidental exposure that does exceed a level of concern. This scenario assumes an upper estimate of exposure. In a second scenario where consumption of contaminated vegetation by an adult female occurred at the highest level of exposure. This involves consumption of considerable vegetation, sprayed with herbicide, immediately following application. This is deemed an unlikely scenario. Herbicide applications will not occur to plants that produce fruit or vegetation that could be gathered for human consumption at a time when edible fruit/vegetation is present, areas receiving herbicide application will be posted to notify public of the application. People will be prohibited from entry until dry. Use of a SPI will alert the public to the presence of an herbicide application. Project specific BMPs will buffer application proximity to water. Mixing and loading will occur more than 200 feet from water and on average less than 30 gallons of herbicide will be mixed in backpacks at any one time. The batch truck will reamin on access roads and will be secured, which will reduce the chance for spills. The primary spill potential will be with applicators and backpacks, which will be a maximum of 30 gallons (if 10 workers wearing 3-gallon capacity backpacks spilled their contents).

2.4.5 Imazapyr (Stalker, Polaris, Habitat, Polaris SP)

2.4.5.1 Worker

Imazapyr is deemed unlikely to adversely affect applicators. Hazard quotients were well below the levels of concern for both general exposure and accidental exposure. Application methods, BMP’s and buffers will insure that exposure levels of concern will not be met or exceeded.

2.4.5.2 Public

All hazard quotients are below a level of concern. Both direct spray and accidental exposure scenario hazard quotients are well below the level of concern. Those scenarios where the hazard quotient approaches, but remain below a level of concern include water consumption by a child, and the consumption of contaminated vegetation by an adult female. These scenarios are deemed very unlikely given the parameter of this project as described earlier.

2.4.6 Sulfometuron (Oust)

2.4.6.1 Worker and Public

Considering both chronic and acute exposure, all but one hazard quotients are well below the level of concern in all likely sulfometuron exposure scenarios for both applicators and the public. Chronic/long- term exposure assessments indicate levels that could exceed the RfD for an adult female who would repeatedly contact contaminated vegetation from a treatment site following a single application. The scenarios are conservative and represent the most likely and greatest potential for exposure. Specifically, this individual would need to consume freshly treated vegetation daily from the treatment site for a period of 90 days. The herbicides are typically dry within 1 hour and no longer a hazard. Additionally, Oust will be applied to the soil to maintain bare ground. Proposed applications and BMP’s in the plan should further increase the margin of safety.

2.4.7 Triclopyr (TEA) (Garlon 3A)

Triclopyr (TEA), as Garlon 3A, will be prescribed and applied as one component of the program. Risk Assessments were conducted using the application rate will be 2 pound AE per acre. Certain scenarios may result in exposures that exceed levels of concern.

2.4.7.1 Workers

Hazard quotients for upper estimates of acute exposure are below a level of concern. Hazard quotients do exceed levels of concern for long term or chronic exposure at the highest anticipated level. This scenario is conservative and static. This assumes continual broadcast application for an 8-hour day for several days. Application conditions will vary greatly with each application at each location. Applicators applying daily for an extended period might be more likely to approach this level. Sporadic application frequencies, consistent with the anticipated applications for the UARP VIWMP plan are deemed unlikely to result in exposures that approach levels of concern.

2.4.7.2 Public

The RfD for an adult female of child bearing age is 0.05 mg/kg. This RfD value is one (1) for a child. Considering and the central estimates of acute exposure, only one scenario exceeded the RfD: a female contacting contaminated vegetation at the maximum projected exposure, hazard quotients for an adult women levels of concern for both acute and chronic effects. The most significant acute and chronic exposure was the result of an adult female contacting contaminated vegetation and situations where women consumes contaminated fruit. These scenarios are conservative as they require these individuals be present at the time of application and would have to contact/consume all treated vegetation immediately after application. The public will be prohibited from entry until after the applications and the herbicides have dried. The chronic risk would result from a prolonged exposure to treated vegetation. This scenario is not deemed plausible considering that much of the area is remote and not used significantly for recreation. It is important to understand that significant exposure would require repeated exposure to vegetation or consumption of vegetation immediately following application. This scenario also assumes that the same vegetation is repeatedly treated, which will not occur.

2.4.8 Triclopyr (BEE) (Garlon 4 Ultra)

2.4.8.1 Workers

Incidental exposure scenarios triclopyr ester suggest that exposure from contaminated gloves can be significant with one or more hours of exposure. Hazard quotients for general chronic exposure exceed a level of concern for the upper level application volumes when applications are made via back pack. These risk assessments consider broadcast backpack foliar applications. Proposed Project use of triclopyr ester will be limited to specific spot treatments and would not include broadcast applications. Low-volume basal and cut stump methods are proposed as well. Basal and cut-stump applications are made to the lower 12 inches of the target plant stems. Drift is minimal to non-existent with this method compared to foliar applications.

2.4.8.2 Public

Six scenarios project hazard quotients exceeding levels of concern. Two occur with the central, and four occur with the upper exposure estimate levels. They involve contact with or the consumption of fruit and vegetation immediately following application. Three are non-accidental acute exposure. An additional three consider the long-term risks. These scenarios are conservative and not likely to occur. The public will be prohibited from entry until the herbicides have dried after the applications mitigating against contact contamination. Chronic risk would result from a prolonged, repeat exposure to and consumption of treated vegetation. Significant exposure would require repeated (several consecutive days) contact with vegetation following application. This scenario is highly unlikely considering that much of the proposed treatment area is remote and only used intermittently for recreation. Basal applications are made at a time of year when no foliage is present on the target plants for the public to contact, and no fruit is present on the plants to eat. Additionally, the scenarios require that individuals are present at the time of application and contact vegetation immediately after application.

2.4.9 Triclopyr TCP Metabolite

This assessment considers the risk of exposure from the metabolite TCP, a breakdown component of triclopyr. Only those long-term scenarios where TCP could present a risk are considered. The explanation is found on tab (Chemical notes) of the TCP MS Excel spread sheet, SERA 2017i). All worksheets regarding worker exposure are removed along with direct exposure scenarios for the public. The maximum application rate reflects the prescribed use of Garlon 3A (Triclopyr (TEA)), 2.0 pounds AE. Garlon 3A will be the most commonly used formulation and is most representative of the project and the potential exposure from triclopyr.

2.4.9.1 Workers

There are no scenarios or subsequent data for TCP for workers.

2.4.9.2 Public

Exposure assessments for the general public consider exposure to vegetation, water, fruit, and fish contaminated with triclopyr and subsequently the metabolite TCP. 15 scenarios project Hazard Quotient (HQs) well above a level of concern. At the central and upper levels of application volume, adult females are at risk from the consumption of contaminated fruits and vegetation and prolonged exposure to contaminated vegetation. These scenarios assume prolonged exposure and the consumption of considerable amounts of fruit or water contaminated by the TCP. Consumption and exposure scenarios are acute, conservative, and consider significant levels of exposure and consumption in only the highest level of exposure estimates.

2.5 SUMMARY OF RISK ANALYSIS TO WORKERS

Tables 19 and 20 illustrate that several of the exposure scenarios for workers approach or exceed a level of concern (i.e. are greater than one), involving the use of triclopyr (TEA and BEE). Considering the upper levels of potential exposure from both formulations of triclopyr, there is a long term risk to workers. However, considering acute exposure levels resulting from proposed application rates, there is no elevated risk from the use of triclopyr (TEA formulations). Considering acute risk with the use of triclopyr, there is a level of concern with the proposed application rate for this project. This risk is from the upper application range of immersion of the herbicide on the hands for 1 minute, for immersion of the herbicide on a contaminated glove for an hour and for both 1 hour spill scenarios. Based on the values for aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr and sulfometuron methyl the risk characterization for workers is considered negligible. This implies that even under the maximum proposed application rates, workers can apply aminopyralid, chlorsulfuron clopyralid, glyphosate, imazapyr and sulfometuron methyl over the long-term without any expected toxic effects. It also implies that even under the most conservative set of accidental exposures (which should be infrequent events) workers will not face an unacceptable level of risk. All of these chemicals can cause irritation and damage to the skin and eyes with prolonged exposure to the concentrate; however, these effects can be minimized or avoided by safe handling practices and the use of personal protective equipment such as eye protection.

Table 19. Hazard Quotients for Backpack Applicators from General (Non-Accidental) Exposures to Aminopyralid, Clopyralid, Glyphosate, Imazapyr and Triclopyr (TEA and BEE formulations)

Chemical	Hazard Quotient[a,b]		
	Typical Exposure levels	Lower Exposure levels	Upper Exposure Levels
Aminopyralid	0.003	.0001	0.02
Chlorsulfuron	3E-03	7E-05	3E-02
Clopyralid	0.02	4E-04	7E-02
Glyphosate	1E-02	5E-04	8E-02
Imazapyr(chopper)	2E-03	6E-05	1E-02
Sulfometuron methyl	9E-02	3E-03	0.6
Triclopyr (TEA)	0.5	2E-02	3
Triclopyr (BEE)	1.0	0.05	12

[a] Hazard Quotient is the level of exposure divided by the RfD (reference dose), then rounded to one significant digit.
b in these analyses, data are displayed for three different exposure scenarios: typical, lower, and upper. The upper level represents a conservative estimate of a worst-case scenario resulting from the highest application rate, lowest dilution rate, and largest number of acres treated per day.

Table 20. Hazard Quotient for Herbicides (Backpack Applicators) from Accidental/Incidental Exposures to Lower and Upper Application Rates

Chemical	Hazard Quotient[a]							
	Immersion of Hands(gloves) (1 minute)		Contaminated Gloves (1 hour)		Spill on Hands (1 hour)		Spill on Lower Legs (1 hour)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Aminopyralid	2E-08	7E-07	1E-06	4E-05	1E-06	2E-04	1E-05	5E-04
Chlorsulfuron	1E-07	2E-06	9E-06	1E-04	3E-06	1E-04	8E-06	3E-04
Clopyralid	8E-08	2E-06	5E-06	1E-04	1E-05	4E-04	3E-05	1E-03
Glyphosate	4E-07	1E-05	2E-05	6E-04	6E-05	8E-04	1E-04	2E-03
Imazapyr(chopper)	9E-06	7E-05	5E-04	4E-03	7E-05	9E-04	2E-04	2E-03
Sulfometuron methyl	3E-07	3E-06	2E-05	2E-04	4E-06	1E-04	9E-06	3E-04
Triclopyr (TEA) Formulation	2E-05	2E-04	1E-03	1E-02	3E-04	4E-03	7E-04	1E-02
Triclopyr (BEE)	1E-02	8E-02	0.8	**5**	1E-03	1E-02	3E-03	3E-02

[a] Hazard Quotient is the level of exposure divided by the RfD (reference dose), then rounded to one significant digit.

2.6 SUMMARY OF RISK ANALYSIS TO GENERAL PUBLIC

2.6.1 Direct Spray

Table 21 displays the hazard quotients for the direct spray scenarios. No levels exceed concern. While it is plausible that a child or woman may be passing by during application of the herbicides and could receive exposure, it is unlikely that they would receive direct spray. This is because one or the other party involved (a woman and child, and an applicator) would most likely notice and avoid the other party. This would minimize any exposure, and would not likely result in direct spray to the whole body of a child, or to the feet and lower legs of a woman.

Table 21. Hazard Quotient for the Public—Direct Spray Scenario

Chemical	Hazard Quotient[a]					
	Child (whole body)			Woman (feet and lower legs)		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid	.001	2E-04	0.008	.0001	2E-05	6E-04
Chlorsulfuron	8E-04	1E-04	5E-03	8E-05	1E-05	5E-04
Clopyralid	3E-03	4E-04	2E-02	3E-04	4E-05	2E-03
Glyphosate	9E-03	2E-03	3E-02	9E-04	2E-04	3E-03
Imazapyr	8E-03	3E-03	3E-02	8E-04	3E-04	3E-03
Sulfometuron Methyl	8E-04	1E-04	4E-03	8E-05	1E-05	5E-04
Triclopyr (TEA)	4E-02	1E-02	0.2	8E-02	2E-02	0.3
Triclopyr (BEE)	0.1	4E-02	0.5	0.3	8E-02	0.9

[a] Hazard Quotient is the level of exposure divided by the reference dose (RfD), then rounded to one significant digit.

2.6.2 Contaminated Vegetation

Table 22 demonstrates that, for members of the general public that may contact vegetation sprayed with any of the proposed herbicides, there is a negligible level of exposure risk.

Table 22. Hazard Quotient for the Public—Contact with Vegetation Sprayed with Herbicides

Chemical	Hazard Quotient[a]		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid	1E-04	2E-05	6E-04
Chlorsulfuron	7E-05	1E-05	3E-04
Clopyralid	2E-04	5E-05	1E-03
Glyphosate	1E-03	3E-04	3E-03
Imazapyr	3E-04	1E-04	8E-04
Sulfometuron methyl	7E-05	2E-05	3E-04
Triclopyr (TEA) Formulation	0.09	0.03	0.3
Triclopyr (BEE)	0.3	0.1	0.8

[a] Hazard Quotient is the level of exposure divided by the reference dose (RfD), then rounded to one significant digit.

2.6.3 Contaminated Water

For the accidental spill scenarios, the exposure levels that approach the level of concern (i.e., HQ>1) are scenarios involving a child that consumes water contaminated with glyphosate at the upper level, and triclopyr (BEE & TEA formulation,) at proposed and upper levels of exposure (Table 23). A conservative aspect to the water contamination scenario is that it represents standing water, with no dilution or degradation of the herbicide. This is unlikely in a forested situation where flowing streams are more likely to be contaminated in a spill, rather than a standing pond of water. Nonetheless, this and other acute scenarios help to identify the types of scenarios that are of greatest concern and those that may warrant the greatest steps to mitigate.

Table 23. Hazard Quotient for the Public—Drinking Water Contaminated by Herbicides

Chemical	Hazard Quotient[a]					
	Acute-Spill Scenario (child)			Chronic Scenario (adult male)		
	Typical	Lower	Upper	Typical	Lower	Upper
Aminopyralid	6E-03	3E-04	2E-02	3E-04	4E-06	0.002
Chlorsulfuron	1E-02	5E-04	3E-02	4E-05	5E-06	7E-05
Clopyralid	1E-02	5E-04	3E-02	2E-04	2E-05	4E-04
Glyphosate	5E-02	2E-03	0.2	5E-06	2E-06	2E-04
Imazapyr	2E-02	8E-04	.1	.01	.00000001	.0008
Sulfometuron methyl	8E-03	4E-04	3E-02	8E-06	1E-06	2E-05
Triclopyr (TEA)	0.1	5E-03	0.3	1E-03	2E-10	8E-02
Triclopyr (BEE)	0.1	5E-03	0.3	2E-06	2E-11	1E-04
Triclopyr (TCP)	2E-02	3E-04	1E-01	7E-08	4E-15	3E-06

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

2.6.4 Oral Exposure from Contaminated Fish

For members of the general public, there is no unacceptable level of risk associated with consumption of fish caught from water contaminated with any of the herbicides proposed for use (see Table 24). The highest hazard quotient under these scenarios is 0.8, which was calculated using the upper application limits to represent the worst-case scenario; this value is below the level of concern (1.0) by a factor of 10.

Table 24. Hazard Quotient for the Public—Consumption of Fish Caught from Water Contaminated by Herbicides (Upper Limits are Presented to Represent the Worst-Case Scenario)

Chemical	Hazard Quotient[a]			
	Fish Consumption (accidental spill)		Chronic Fish Consumption	
	Adult Male	Subsistence Population	Adult Male	Subsistence Population
Aminopyralid	4E-04	2E-03	8E-06	7E-05
Chlorsulfuron	6E-04	3E-03	5E-07	4E-06
Clopyralid	6E-04	3E-03	2E-06	1E-05
Glyphosate	1E-03	6E-03	3E-07	3E-06
Imazapyr	7E-04	3E-03	1E-06	9E-06
Sulfometuron Methyl	2E-03	8E-03	5E-07	4E-06
Triclopyr (TEA) Formulation	4E-04	2E-03	2E-05	2E-04
Triclopyr (BEE)	4E-04	2E-03	2E-08	2E-07
Triclopyr (TCP)	2E-02	8E-02	3E-06	2E-05

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

2.6.5 Oral Exposure from Contaminated Vegetation

Table 25 displays the hazard quotient values for scenarios involving a woman eating contaminated fruit and vegetation shortly after spraying and for 90 days after they were sprayed. For aminopyralid, clopyralid and imazapyr, the hazard quotients under all rates of application are below the level of concern of 1. However, for glyphosate, in the case of acute exposure from eating contaminated vegetables at the upper application rate, the hazard quotient (1.4) exceeds the level on concern. Chlorsulfuron and sulfometuron methyl exposures exceed a level of concern when considering the risk from the long-term consumption of vegetation treated at the highest rates. Considering the use of Telar as a pre-emergent, this scenario is unlikely. For triclopyr (TEA formulation), in the case of acute and chronic exposure from eating contaminated fruit at the upper application rate, the hazard quotients (7 and 5 respectively) exceed the level of concern. In the case of acute exposure from eating contaminated vegetation, the hazard quotients of the typical and upper application rates (6 and 54 respectively and 108 for TCP) exceed the level of concern. In the case of chronic exposure from eating contaminated vegetation, only the hazard quotient (13, TCP 53) of the upper application rate exceeds the level of concern. For triclopyr (BEE formulations), in the case of acute and chronic exposure from eating contaminated fruit at the upper application rate, the hazard quotients (7 and 5 respectively) exceed the level of concern. In the case of acute exposure from eating contaminated vegetation, the hazard quotients of the typical and upper application rates (6 and 54 respectively) exceed the level of concern. In the case of chronic exposure from eating contaminated vegetation, only the hazard quotient (13) of the upper application rate exceeds the level of concern. TCP mirrors both formulations with a slightly lower set of HQ’s that exceed; levels of concern when considering these exposure scenarios.

Table 25. Hazard Quotient for the General Public—Ingesting Fruit and Vegetation Contaminated by Herbicides

Chemical	Hazard Quotient[a]					
	Acute Exposure			Chronic Exposure		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid						
Fruit	0.001	6E-04	0.02	6E-04	2E-04	0.01
Vegetation	0.02	0.001	0.1	0.008	4E-04	0.08
Chlorsulfuron						
Fruit	2E-03	1E-03	4E-02	1E-02	6E-03	0.2
Vegetation	3E-02	2E-03	0.3	0.2	1E-02	1.4
Clopyralid						
Fruit	2E-03	1E-03	3E-02	4E-03	2E-03	9E-02
Vegetation	3E-02	2E-03	0.3	6E-02	3E-03	0.7
Glyphosate						
Fruit	1E-02	5E-03	0.2	2E-03	9E-04	3E-02
Vegetation	0.2	1E-02	1.4	0.03	0.002	0.2
Imazapyr; Chopper						
Fruit	2E-03	7E-04	2E-02	7E-04	2E-04	1E-02
Vegetation	2E-02	1E-03	0.2	9E-03	4E-04	9E-02
Sulfometuron Methyl						
Fruit	2E-03	9E-04	3E-02	1E-02	6E-03	0.2
Vegetation	3E-02	2E-03	0.2	0.2	1E-02	1.5
Triclopyr (TEA)						
Fruit	0.5	0.2	7	0.2	0.06	5
Vegetation	6	0.5	54	0.6	0.02	13
Triclopyr (BEE)						
Fruit	0.5	0.2	7	0.2	0.06	5
Vegetation	6	0.5	54	0.4	0.008	13
TCP						
Fruit	0.1	6E-02	**2**	0.2	8E-02	**4**
Vegetation	**1.8**	0.1	**15**	**1**	3E-02	**19**

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

These hazard quotients illustrate that there is some variability regarding the potential effects of consuming contaminated fruit and vegetation; however, considering that these hazard quotients are near the level of concern, it is unlikely that adverse health effects would result in most of these scenarios. The exception is the case of acute exposure at the upper application rate in which it exceeds the level of concern and likely that adverse health effects would result. It is also important to take into account the fact that these scenarios do not include the mitigative effects of washing contaminated vegetation. The blue dye that will be added to the herbicide would most likely deter most adults from consuming contaminated vegetation. Also, after treatment, vegetation would show obvious signs of herbicide effects and would likely be undesirable for consumption.

2.6.6 Risk Assessment Summary

The risk characterization for workers is reasonably simple and unambiguous; based on a generally conservative and protective set of assumptions regarding both the toxicity of the proposed chemicals and the potential exposures, there is no basis for suggesting that adverse effects are likely in workers at the typical application rates for the Proposed Action for aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr sulfometuron methyl and triclopyr (TEA formulation) (SERA 2017). However, from the typical application rate of triclopyr (BEE formulation), there is a slight risk to workers from wearing contaminated gloves for one hour and a general risk from long term repeated application of and exposure to the herbicide and its metabolite. However, it is not reasonable to assume or postulate that the hands or any other part of a worker will be immersed in a solution of an herbicide for any period. On the other hand, contamination of gloves or other clothing is quite plausible. For this exposure scenario, the key element is the assumption that wearing gloves grossly contaminated with a chemical solution is equivalent to immersing the hands in a solution. In either case, the concentration of the chemical in solution that is in contact with the surface of the skin and the resulting dermal absorption rate are essentially constant. From a practical perspective, the most likely accidental exposure for workers (i.e. one that might require medical attention) may involve accidental contamination of the eyes. All of the proposed chemicals can cause irritation and damage to the skin and eyes; however, these effects can be minimized or avoided by safe handling practices and the use of personal protective equipment such as eye protection.

For members of the general public, aminopyralid, clopyralid, and imazapyr applications would result in a negligible risk under all of the scenarios. Even at the highest application rate of 0.11, 0.14 and .33 lb. a.e./acre, respectively, the hazard quotients are below the level of concern.

Glyphosate applications would result in exposure levels that slightly exceed the level of concern (i.e. a hazard quotient greater than one) in only one scenario involving the general public consuming contaminated vegetation with glyphosate (upper application rate). Similar risk is assigned to chlorsulfuron and sulfometuron methyl. Under normal circumstances, it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with the proposed herbicides. One exception to this could be plants collected by Native Americans for basket weaving or medicinal use. However, in most instances, particularly for longer-term scenarios, treated vegetation would probably show signs of damage from herbicide exposure, thereby reducing the likelihood of consumption that would lead to significant levels of human exposure.

Additionally, as part of the project design criteria, in areas in which members of the general public might consume vegetation/fruit where herbicides are intended to be used, applications would be made once the fruit has deteriorated and dried up (senesced) and is no longer edible, typically in Mid-October. Chlorsulfuron and sulfometuron methyl are proposed primarily for pre-emergent weed control. Contamination of edible fruit or vegetation is highly unlikely.

For triclopyr (TEA formulation), the general public scenarios that exceed the level of concern of a hazard quotient above 1 were the scenarios involving short term/long term exposure from consumption of contaminated fruits and/or vegetation. Under normal circumstances it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with the proposed herbicides. Additionally, as part of the project design criteria, in areas in which members of the general public might consume vegetation/fruit where herbicides are intended to be used the vegetation would be treated prior to berry formation or fruit being present. Follow-up herbicide applications would be made once the fruit has deteriorated and dried up (senesced) and is no longer edible, typically in Mid-October. The intent for the specific timing on these two applications is to reduce the risk of the public consuming herbicide treated vegetation/fruit.

2.7 RISK CHARACTERIZATION FOR ADJUVANTS

2.7.1 Competitor (Source: Bakke 2007)

Competitor may be used as a surfactant with any of the proposed herbicides for this project, or as a diluent with Imazapyr or Triclopyr (BEE). Competitor has been assigned a “caution” signal word and the label indicates that improper use may cause irritation to the skin and eyes. The main ingredient in Competitor is an esterified vegetable oil. It also contains two emulsifiers, sorbitan alkylpolyethoxylate ester and dialkyl polyethoxylene glycol. Vegetable oil surfactants are gaining in popularity due to their capability to increase herbicide absorption and spray retention (Bakke 2007). The U.S. Food and Drug Administration (FDA) considers methyl and ethyl esters of fatty acids produced from edible fats and oils to be food grade additives (21 CFR 172.225). However, because of the lack of exact ingredient statements on these surfactants, it is not always clear whether the oils used meet the U.S. FDA standard None of the ingredients in this product are known to be on EPA List 1 or 2. Its primary ingredient is food-grade ethylated canola oil. Manufacture labels recommend using 0.25-1% surfactant mixed with the herbicide.

2.7.2 Toxicological and Environmental Characteristics of Spray Pattern Indicators containing Blue Acid 9

2.7.3.1 Background

Spray Pattern Indicators (SPI’s) are used extensively in crop and non-crop agriculture and in the industrial non-crop vegetation management markets. These materials are also used in the turf and landscape markets. SPI's insure the accurate and responsible application of herbicides. In addition, SPI's allow applicators to determine if drift or runoff is an occurring. SPI's also alert the public to an application, thus avoiding accidental or unintended exposure (USDA Forest Service, SERA Risk Assessments 2003; UK Forest commission report, 2007). SPI's are available in a variety of colors. The most common color is blue. Many of these blue-patterned indicators have various concentrations of the pigment identified as Blue acid 9. Blue acid 9 is the pigment in two pattern indicators commonly used in California, which go by the trade names of Blazon Blue and Hi-Light. These will be the focus of this discussion.

2.7.3.2 Physical and Chemical Properties

Both Blazon and Hi-Light are very water soluble and not considered persistent. Upon application to the soil, the SPI dissociates from the herbicide treatment. The SPI is then subject to photo- degradation and exhibits dissolution in the event of rain. When applied at labeled rates, these SPI's are expected to degrade completely within 7 days, however doubling the concentration (application rate) can extend the visibility of the SPI for an additional 7 to 10 days. One significant difference between Blazon and Hi-Light is the formulation. Hi-light is blue acid pigment formulated to create a concentrated SPI. Blazon is a polymeric color agent. The chromaphor (color portion) is encapsulated in a polymer. This encapsulation allows for coloring, but resulting in a marker that is non-staining, more water soluble and is less persistent in the environment. The encapsulation also renders the pigment inert, further reducing potential environmental impacts. These materials are designed to be short-lived providing adequate evidence of application without persistence.

2.7.3.3 Toxicological properties

SPI's are not regulated as a pesticide. As such, toxicological and environmental data on formulated products is limited. However, there is information on the colorant Acid blue 9 and the active ingredient and formulated products including, Aquashade an aquatic pesticide as well as Blazon and Bullseye spray pattern indicators. Aquashade is considered a pesticide. Its intended use is aquatic vegetation control via shading. Blue Acid 9 is used extensively in the production of detergents, soaps, cosmetics, and other consumer goods including food products Below is a table with basic toxicological information on select SPI's. While technical data is not readily available literature suggests that there is little risk to the public or the environment from Blue Acid 9 and those SPI's that contain this pigment.

Table 26. Aquatic Toxicity for Spray Pattern Indicators

Product	Oral Toxicity	Dermal Toxicity	NOAEL*	Hazard Classification	Aquatic Toxicity
Acid Blue 9	>2000	4600	>600 rat	Food Grade	>300
Aquashade	>2000	NA	>5000 mice	Aquatic label; caution	> 1000

Blazon	>5000	Mild irritant	NA	Caution	NA

*No observed adverse effect level

The USDA Forest Service has evaluated the risk to both the applicator and the public from the use of colorants (SERA, 1997). They found the protective benefits of the use outweighed any risk associated with use.

2.7.3.4 Sensitive Individuals

The Uncertainty Factor (UF) is used in the development of the RfD, which accounts for much of the variation in human response. This is a factor of 10 and is sufficient to ensure that most people will experience no toxic effects. "Sensitive" individuals are those that might respond to a lower dose than average, which includes women and children. The National Academy of Sciences report entitled, “Pesticides in the Diets of Infants and Children” (NAS, 1993) found that quantitative differences in toxicity between children and adults are usually less than a factor of approximately ten-fold. A Margin of Safety (MOS) of 100 may not cover individuals that may be sensitive to herbicides because human susceptibility to toxic substances can vary by two to three orders of magnitude. Factors affecting individual susceptibility include diet, age, heredity, pre-existing diseases, and lifestyle. Individual susceptibility to the herbicides proposed in this project cannot be specifically predicted. Unusually sensitive individuals may experience effects even when the MOS is equal to or greater than 100.

Women of child-bearing age and children are expected to be at greater risk from the exposure of certain herbicides such as Triclopyr (BEE) (SERA, 2011c).

2.8 CONNECTED ACTIONS

2.8.1 Synergistic Effects (Bakke 2007)

Synergistic effects are those effects resulting from exposure to a combination of two or more chemicals that are greater than the sum of the effects of each chemical alone (additive). Refer to USDA (1989, as referenced in USDA 2003) for a detailed discussion on synergistic effects.

It is not anticipated that synergistic effects would be seen with the additives proposed in this Plan. Based on a review of several recent studies, there is no demonstrated synergistic relationship between herbicides and surfactants (Abdelghani et al 1997; Henry et al 1994; Lewis 1992; Oakes and Pollak 1999, 2000 as referenced in Bakke 2007).

Although the combination of surfactant and herbicide might indicate an increased rate of absorption through the skin, a review of recent studies indicates this is not often true (Ashton et al 1986; Boman et al 1989; Chowan and Pritchard 1978; Dalvi and Zatz 1981; Eagle et al 1992; Sarpotdar and Zatz 1986; Walters et al 1993, 1998; Whitworth and Carter 1969 as referenced in Bakke 2007). For a surfactant to increase the absorption of another compound, the surfactant must affect the upper layer of the skin. Without some physical effect to the skin, there will be no change in absorption as compared to the other compound alone. The studies indicate that in general non-ionic surfactants have less of an effect on the skin, and hence absorption, then anionic or cationic surfactants. Compound specific studies indicate that the alkylphenol ethoxylates generally have little or no effect on absorption of other compounds. In several studies, the addition of a surfactant decreased the absorption through the skin. It would appear that there is little support for the contention that the addition of surfactants to herbicide mixtures would increase the absorption through the skin of these herbicides.

2.8.2 Cumulative Effects

The proposed use of herbicides could result in cumulative doses of herbicides to workers or the general public. Cumulative doses from the same herbicide result from: (1) additive doses resulting from various routes of exposure from this project, and (2) additive doses if an individual is exposed to other herbicide treatments.

Additional sources of exposure include: use of herbicides on adjacent private timberlands, use of herbicides on adjacent National Forest System lands, or home use by a worker or member of the general public. These herbicides are used for weed control throughout the county. Applications are random and seldom proximate. It is deemed unlikely that additional applications will be made consistently within one mile of the proposed treatment sites.

These herbicides are not persistent in the environment (i.e., generally half-lives of less than one year), do not bio accumulate, and are rapidly eliminated from the body if consumed or exposed to (SERA, WSSA, and Product MSDS Sheets). Additionally, herbicide application to a particular site will not be on an annual basis, but rather every 2 to 4 years. We do not anticipate any additive herbicide accumulation from re-treatment in following years or adjacent applications, as the project area is surrounded by National Forest and is not likely to be treated on an annual basis and the herbicides used will degrade within the year.

3.0 REFERENCES

Ando, C., L. Li, J. Walters, C. Gana, R. Segawa, R. Sava, T. Barry, P. Lee, S. Tran, J. White, J. Hsu, and K. Goh. 2002. Residues of Forestry Herbicides in Plants of Interest to Native Americans in California National Forests. December 2002.

Bakke, D. 2007. Analysis of issues Surrounding the Use of Spray Adjuvants with Herbicides. Original 2002, revision 2007. US Forest Service. http://www.fs.fed.us/r6/invasiveplant-eis

Department of Pesticide Regulation (DPR), 2001. National Forest Herbicide Monitoring Report, Progress Report #3 (Final Issue), Residues of Forestry Herbicides in Plants of Interest to California Tribes, May, 2001.

Goh, Kean S. 1999. Agricultural Program Supervisor IV; Preliminary Results of Surface Water Monitored for Forestry Herbicides in the Yurok Aboriginal Territory in the Klamath River Watershed. DPR. Spring 1999.

Guilherme Sousa Alves 1, João Paulo Arantes Rodrigues da Cunha 1(1)Universidade Federal de Uberlândia, Instituto de Ciências Agrárias,Campus Umuarama, Caixa Postal 593, CEP 38400902. Uberlândia, MG,Brazil. Email:guilhermeagro43@yahoo.com.br, jpcunha@iciag.ufu.br

National Academy of Sciences (NAS). 1993. Pesticides in the Diets of Infants and Children. NATIONAL ACADEMY PRESS. Washington, D.C. 1993.

Schuette, Jeff. 1998. Environmental Fate of Glyphosate. Environmental Monitoring and Pest Management. Department of Pesticide Regulation. Sacramento, CA. Accessed online on January 30, 2014 at: http://www.cdpr.ca.gov/docs/emon/pubs/fatememo/glyphos.pdf

Sierra Nevada Ecosystem Project. (SNEP). 1996. Final report to Congress. Sierra Nevada Ecosystems. Vol 1. Ch 1. http://ceres.ca.gov/snep/pubs/web/PDF/v1_ch01.pdf; USGS DDS-43, *Sierra Nevada*Ecosystems

Syracuse Environmental Research Associates, Inc. (SERA). 1997. Use and Assessment of Marker Dyes Used With Herbicides. Prepared for USDA Forest Service by Syracuse Environmental Research Associates, Inc. Syracuse, New York. Available at: http://www.fs.fed.us/foresthealth/pesticide/pdfs/091602_markerdyes.pdf

____. 2017a. Aminopyralid - Human Health and Ecological Risk Assessment Work Sheets. Syracuse Environmental Research Associates. SERA TR TR-052-04-04a.

____. 2017b. Chlorsulfuron - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA TR 05-43-23-05a. Version 6.01.06.

____. 2017c. Chopper, Backpack Directed Foliar: Imazapyr - Human Health and Ecological Risk Assessment Work sheets. Syracuse Environmental Research Associates. SERA Version 6.01.16

____. 2017d. Clopyralid - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. Version 6.01.16

____. 2017e. Glyphosate(less toxic forms) -Human Health and Ecological Risk Assessment Work Sheets. Syracuse Environmental Research Associates. Version 6.01.16

____. 2017f. Hexachlorpbenzene - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA TR 05-43-23-13a.Version 4.04. Version 6.01.16

____. 2007g. Risk assessments for select herbicides. Prepared for USDA Forest Service by Syracuse Environmental Research Associates, Inc. Syracuse, New York. 2007 through 2011. Available at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

____. 2017h. Sulfometuron Methyl - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.06.

____. 2017i. TCP -Revised Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.00.01.

____. 2017j. Triclopyr BEE Formulations - Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.16

____. 2017k. Triclopyr TEA Formulations - Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.16

U.K. Forestry Commission. 2007. “Using Dye Markers to Reduce Pesticide Use”. www.forestry.uk.gov

U.S. Department of Agriculture – Forest Service (USDA-FS). 2002. Analysis of issues surrounding the use of spray adjuvants with herbicides. Unpublished report, written by David Bakke. Pacific Southwest Regional Pesticide-Use Specialist. September 2002. 43 pp.

____. 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act - Supplemental Environmental Impact Statement, Appendix G: Human Risk Assessment. Pacific Southwest Region, Lassen, Plumas and Tahoe National Forests. September 2003.

U.S. EPA. 1994. Draft Cleaner Technologies Substitutes Assessment (CTSA): Screen Reclamation Chemicals, Chapter 2. US Environmental Protection Agency, EPA 744R-94-005a, September 1994. http://www.epa.gov/dfe/pubs/screen/ctsa/ch02.html

U.S. EPA/OPP. 2005. U.S. EPA/OPP (U.S. Environmental Protection Agency/Office of Pesticide Programs) 2005b. Level 1Screening Ecological Risk Assessment for the Reregistration of Imazapyr.

U.S. EPA E-Docket EPA-HQ-OPP-2005-0495. EPA File Name: EPA-HQ-OPP-2005-0495-0009.pdf. Available at: www.regulations.gov.

____. 2007. U.S. EPA/OPP (U.S. Environmental Protection Agency/Office of Pesticide Programs) 2007a. Risks of Imazapyr Use to the Federally Listed California Red Legged Frog (Rana aurora draytonii), Pesticide Effects Determination. Includes Appendices A-K and Attachments 1 and 2. Documents dated July 20, 2007. Available at: http://www.epa.gov/espp/litstatus/effects/redleg- frog/#imazapyr.

Weed Science Society of America (WSSA). Herbicide Handbook. 10th edition. 2014.

Appendix B
Transmission Vegetation Management Procedure for the Upper American River Project Vegetation and Invasive Weed Management Plan

SMUD	TECHNICAL PROCEDURE	No. TP6602 Page i REV6 DATE: 6/14

CATEGORY

MAINTENANCE

SUBJECT

TRANSMISSION VEGETATION MANAGEMENT PROCEDURE

RECORD OF REVISIONS

1. Original Issue. 06/30/2004
2. Reformatted and Updated to meet NERC FAC-003-1 requirements, 9/7/2007
3. Changed title of Table 1 to read Table 2 and modified the table 2 to reflect only Clearance 2 clearances. Created new Table 1 to reflect new Clearance 1 species-specific clearance. 01/03/2008
4. Update to incorporate Title 14, California Code of Regulation and new standard format. Reformatted Table 1 and Table 2 replacing table notes with clarifying paragraphs. 02/2011
5. Document organized to conform to North American Transmission Forum Model Transmission Vegetation Management Procedure –TVMP. Reporting section expanded to include quarterly and outage reporting procedures. 10/2012
6. Document updated to meet NERC FAC-003-3 requirements, 6/27/2014

APPROVED BY:

7-16-14 Steve Hallmark DATE Program Manager, Vegetation Management	7/16/14 Ed LaBranch, DATE Mgr, T&D Line Design, Construction & Maintenance
7-16-14 Tony Deluca DATE Program Manager, T&D Engineering Assets	7/17/2014 Mike Rudek DATE Standards Administration

TABLE OF CONTENTS

NERC RELIABILITY STANDARD FAC-003-3 TO SMUD CROSS REFERENCE

	SMUD TVMP	Description
R1	Not Applicable	Applies to Generation Owners who own overhead transmission lines
R2	SMUD NERC Critical 230 kV list	Overhead transmission lines operated at 200kV or above
R2	Quarterly WECC Reports	Any encroachment (Types 1-4) into the Minimum Vegetation Clearance Distance (MVCD)
R3	1.5. Work Methods and Practice	Documented maintenance strategies or procedures
R3.1	5. Regulatory Clearance Requirements	Movement of applicable line conductors under their Rating and all Rated Electrical Operating Conditions
R3.2	1.7.3. In Cycle Pruning (Table 3)	Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.
R4	3.4.1. Vegetation Management	Notify the control center of a confirmed existence of a vegetation condition that is likely to cause a Fault at any moment.
R5	4. Imminent Threat Emergency Procedures	Constrained from performing vegetation work on an applicable line operating within its Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan
R6	1.6. Inspections	Vegetation Inspection of 100% of its applicable transmission lines
R7	2. Annual Plan	Complete 100% of its annual vegetation work plan of applicable lines

(FAC) Facilities Design, Connections, and Maintenance

1. The Program

1.1. Purpose and Scope

This standard documents the Transmission Vegetation Management Procedure (TVMP) and supports compliance with regulatory requirements, and encompasses all transmission line vegetation management activities within the Sacramento Municipal District's (SMUD) transmission line rights-of-way and easements.

1.2. Objectives

SMUD employs the TVMP to maintain reliability of the overhead transmission facilities. SMUD's TVMP maintains transmission line reliability by preventing outages caused by vegetation located in and adjacent to transmission line rights-of-way. The program does this by establishing work practices and approved procedures for controlling specified clearances between transmission lines and vegetation.

1.3. Strategy

The Routine VM program strategy is to perform an annual patrol and complete identified tree work of 100% of the overhead transmission facilities to maintain radial clearance between vegetation and conductors/structures and to identify hazard trees which may strike the conductors or encroach within the Minimum Vegetation Clearance Distance (MVCD). This approach allows for ongoing monitoring of vegetation conditions to prevent an encroachment into the MVCD (see Table 2.) and to prevent reasonably foreseeable outages and/or possible fire ignitions.

1.4. Approach

The Right-of Way (ROW) Maintenance Program approach is to clear the ROW of incompatible species and to maintain low-growing diverse plant communities that are compatible with electrical facilities by using Integrated Vegetation Management (IVM) methods. This is a long-term approach which supports system reliability through reclaiming the ROW and managing for future workload. This approach allows for ongoing Transmission right-of-way (T-ROW) monitoring of vegetation corridors to prevent encroachment into the MVCD.

1.5. Work Methods and Practice

1.5.1. General

Vegetation Management manages all vegetation to obtain proper clearances as specified in Section 1.5, Clearances, of this standard.

Federal and State Occupational Safety and Health Administration (OSHA) requirements that apply to vegetation management activities shall be followed at all times. Refer to American National Standards Institute (ANSI) Z133.1-1994; Federal OSHA 1910.269; General Order (G.O.) 95, Rule 35; and the following Title 8 sections: Article 36, Sections 2940-2945 and Article 38, Sections 2950-2951.

Tree workers, equipment operators, and ground men shall use personal protective equipment such as hard hats, safety glasses, ear plugs, and chainsaw leg protectors. Activities shall be conducted in a manner that protects crew and public safety. Crews shall have radio or telephone communication on the job at all times. Contractors or sub-contractors are also required to follow the above rules.

1.5.2. Wire Zone and Border Zone Procedures

Vegetation Management shall manage transmission line corridors using the Wire Zone and Border Zone concept. This concept results in diverse habitat types. The wire zones consist of low growing shrub-forb-grass plant community (Early Succession Species). The Border Zone consists of taller shrubs, and brush plant community (transition zone). The concept creates a plant community that is resistant to tree invasion. Vegetation Management can manage the right-of-way for specific plants and varying goals –e.g. Habitat for Threatened, Endangered and Sensitive species such as Valley Elderberry Longhorn Beetle or Lotus Blue Butterfly can be created and maintained.

1.5.3. Procedures in Forest Areas

In designated fire prevention areas, Vegetation Management shall perform maintenance in accordance with the most recent edition of the “Power Line Fire Prevention Field Guide”, published jointly by the California Department of Forestry, the US Forest Service, and the US Bureau of Land Management. This incorporates the requirements of the California Resources Code, Section 4292 and Section 4293 regarding maintenance of clearance zones for transmission facilities.

1.6. Inspections

1.6.1. General

Vegetation Management shall inspect all SMUD transmission line segments once per calendar year. Based on inspections, Vegetation Management may schedule additional inspections where vegetation or hazardous trees may pose an interim threat.

Vegetation Management shall inspect all trees in and adjacent to the right-of-way for the potential of being a hazard tree and capable of contacting SMUD’s transmission facilities.

1.6.2. Inspection Areas

Vegetation Management shall group SMUD transmission facilities into two patrol/inspection areas based on climate, type of vegetation, and anticipated vegetation growth. Vegetation Management shall group into the Valley Area the areas in lower elevations with faster growing vegetation in mostly urban settings such as Sacramento and Placer Counties. Vegetation Management shall consider El Dorado County as a separate patrol/inspection area based on the higher elevations, slower growing vegetation, and more rural settings.

1.6.3. Ground Patrols

In all of the three counties, Sacramento County, El Dorado County, and Placer County, where SMUD has transmission lines, a Transmission Vegetation Patrol Person, a SMUD employee, shall perform a ground patrol once every calendar year. Transmission Vegetation Patrol Person shall inspect each span of wire and tree within or adjacent to the transmission line corridor. They shall list all vegetation that potentially can come into contact with transmission facilities for removal, pruning, or mitigation.

1.6.4. Aerial Patrols

In El Dorado County, Vegetation Management shall, at a minimum, annually patrol each transmission segment aerially for vegetation issues that could threaten SMUD facilities.

1.6.5. Hazard Trees

The Transmission Vegetation Patrol Person shall take special care to identify hazard trees that have died or that have suffered damage and could fall into the transmission right-of-way. This includes trees outside of the actual transmission right-of-way as well as trees in the right-of-way.

1.6.6. Inspection Data

Information recorded at each property for locations requiring maintenance includes the number of trees, tree species, prescription for vegetation management, and customer/location and special instructions such as access issues.

1.7. Clearances

1.7.1. Rights-of-way Management

SMUD manages transmission rights-of-way using the wire zone/border zone concept. With this strategy, SMUD’s Vegetation Management team does not intend to permit trees capable of growing taller than 15 feet to populate the rights-of-way. However, it must be recognized that certain situations promulgate the need to allow tall growing species within the wire zone/border zone. Exceptions include:

- Riparian Zones that agencies with jurisdictional authority require that tall growing species be retained.

- Areas of significant elevation change, placement of towers may span topography, negating the need to remove and/or trim tall growing trees. Such topographical influence would allow for trees at their mature height will exceed Clearance 1 distances.

- Heritage trees or trees of particular cultural and/or historic significance.

For the above mentioned exceptions to the wire zone/border zone, any vegetation requiring maintenance shall be performed according to the Table 1 chart below.

1.7.2. Clearance Types

As defined by NERC Standard FAC-003-3, a Transmission Owner shall determine and document the Minimum Vegetation Clearance Distances to be maintained for separation between a transmission conductor and vegetation.

Table 1: Guidelines for determining clearance distances to maintain separation between vegetation and transmission conductors at all times to meet California Public Resource Code 4293 requirements.

Transmission Line Voltage	Clearance
Less than or equal to 72 kV	4 Feet
Greater than 72 kV less than or equal to 110 kV	6 Feet
Greater than 110 kV	10 Feet

Table 2: Conductor and Structure Clearance Requirements are the minimum in this standard that must always be met (or exceed) in order to maintained to meet the NERC Minimum Vegetation Clearance Distances (MVCD) requirements, as described in this table.

Elevation (feet)	230 kV
Sea Level to 500'	3.03ft
500 – 1000'	3.09ft
1001 – 2000'	3.22ft
2001 – 3000'	3.36ft
3001 – 4000'	3.49ft
4001 – 5000'	3.63ft
5001 – 6000'	3.78ft

1.7.3. In Cycle Pruning

Vegetation work crews shall obtain through pruning or other means described in this standard the clearances in Table 3 for conductors and structures.

Table 3: Vegetation work crews shall obtain through pruning or other means described in this standard, the minimum amount of the clearances in Table for conductors and structures.

Growth Rate Per Year	Species	3 Year Cycle	5 Year Cycle
Fast (> 6 feet)	Cottonwood, Eucalyptus, Mulberry	At least 28 feet	At least 40 feet
Moderate (2 to 6 feet)	Ash, Coastal Redwood, Elm spp, Hackberry, Locust, Oak spp, Sycamore	16-20 feet	20-40 feet
Slow (< 2 feet)	Camphor, Cedar, Pine	Up to 16 feet	Up to 20 feet
spp—multiple specie			

Table 3, Clearance at the Time of Pruning Based on Growth Rate by Species

For work cycle locations, see Sections 2.1.1. Sacramento and 2.1.2. El Dorado.

1.7.4. Out of Cycle Pruning

On specific trees such as Heritage trees, Vegetation Management crews may not be able to obtain clearances listed in Table 3. In these cases, Vegetation Management may shorten the cycle for that specific tree in accordance with the tree’s growth rate to achieve the proper clearance.

1.8. Training

The following personnel shall receive annual TVMP training:

- Vegetation Management Program Manager
- Vegetation Management Supervisors
- Transmission Work Planners
- Transmission Patrolmen

2. Annual Plan

SMUD uses the enterprise work management system SAP. Vegetation Management shall use SAP to track and manage right-of-way corridors for vegetation management. SAP enables Vegetation Management to list all vegetation management work in transmission rights-of-way by location. SAP assists in documentation, scheduling, and work management. SAP also assists in communication with customers that may be affected by vegetation work.

2.1. Schedule and Cycles

Vegetation Management shall review transmission line segment priorities to determine schedules based on maintaining clearances, fire hazard, and customer requirements. Vegetation Management will determine annual schedules and communicate the schedules to internal organizations.

2.1.1. Sacramento & Placer Counties – Three Year Cycle

Vegetation Management shall have a three year work cycle in Sacramento and Placer counties. These counties contain faster growing vegetation with transmission lines that pass through residential zones.

2.1.2. El Dorado County – Five Year Cycle

Vegetation Management shall have a five year work cycle in El Dorado County. The majority of rights-of-way in El Dorado County run through rural and mountainous terrain. Mountainous areas have a shorter growing season and typically slower growing species than those planted in valley locations. Therefore, in El Dorado County, a longer, 5-year cycle can be used to manage SMUD rights-of-ways.

2.1.3. Transmission Line Access

Vegetation Management crews may not have access to all transmission line rights-of-ways at all times. When a property owner restricts access to transmission line rights-of-ways, Vegetation Management shall attempt to coordinate and schedule vegetation management activities with the owner. If the property owner refuses to cooperate with SMUD's crews, SMUD shall take any and all legal actions necessary to gain access to the transmission line right-of-way. SMUD shall not tolerate any access restrictions to maintaining proper transmission line clearances.

2.2. Work Performance

2.2.1. Work Crew Management and Costs

Vegetation Management uses SAP enterprise software to create blanket orders to charge work for SMUD and contractor crews.

2.2.2. Work Crews

Contractor crews will perform actual pruning, removal, mowing and spraying services.

2.2.3. Quality Control

SMUD inspectors shall make a Quality Control inspection of all vegetation management field work.

2.2.4. Work Log

Crew foreman shall keep a daily log. The foreman shall deliver the daily log to Vegetation Management Supervision. The log shall report any discrepancies and corrections to the line segment vegetation list. The daily log shall include notations regarding trees not managed to specifications.

3. Outage Reporting

3.1. Quarterly Reporting

On a quarterly basis, T&D Maintenance shall request from the Vegetation Management workgroup and Power System Operations workgroup any vegetation caused outages during the quarter. T&D Maintenance shall send a report in the WECC format to the Reliability Compliance and Coordination (RC&C) workgroup. RC&C shall quarterly report to WECC.

3.2. Multiple Outages

Multiple sustained outages on a line caused by the same vegetation during a 24 hour period shall be reported as a single outage.

3.3. Reportable Outages

SMUD shall report vegetation caused outages on transmission lines operated at 230 kV or greater or transmission lines operated at lower voltages that have been designated by WECC as critical to the regional electric system reliability.

Vegetation outages caused by natural disasters such as earthquakes, fires, major storms, etc. or human activities such as logging, vehicle contact etc. shall not be reportable.

3.4. Reporting Outages

3.4.1. Vegetation Management

When a transmission line inspector or transmission patrolman determines that an outage on a 230 kV transmission line has been caused by vegetation, they shall report to the Power System Operator. They shall also report the following to the T&D Maintenance workgroup:

- Name of the transmission circuit
- Date and time of the outage
- Category of the outage

3.4.2. T&D Maintenance

T&D Maintenance shall report all Category 1 and Category 2 outages in a WECC format to the RC&C workgroup in time enough for them to report to WECC within 48 hours of the determination of an outage being caused by vegetation.

3.4.3. Outage Report Contents

The outage report for WECC shall include the following:

- Name of the transmission circuit
- Date and time of the outage
- Duration of the outage
- Description of the outage

- Pertinent comments
- Any counter measures taken
- Category of the outage

3.5. Outage Categories

When reporting on vegetation caused outages, Vegetation Management shall report outages as one of the following categories.

3.5.1. Category 1B - Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major Western Electricity Coordinating Council (WECC) Transfer Path, by vegetation inside and/or outside of the ROW.

3.5.2. Category 2B - Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW**.**

3.5.3. Category 3 - Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW**.**

3.5.4. Category 4B - Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

4. Imminent Threat Emergency Procedures

For compliance with FAC-003-3, SMUD's Imminent Threat Procedure provides guidance for the notification and mitigation of any vegetation condition which is likely to cause a fault at any moment. This includes vegetation which under observed conditions encroaches within the MVCD distances (Table 2), or poses an imminent threat to the reliability of the transmission facilities. This procedure applies to all SMUD VM employees and VM contractors.

4.1. SMUD Emergency Procedures

All emergencies are directed to Distribution System Operations (DSO), extension (916) 732-5334. In the event that trees or other vegetation pose an imminent threat to SMUD facilities, DSO will be notified. DSO shall notify Vegetation Management to correct any vegetation hazards/threats to SMUD facilities. Outside normal work hours, DSO shall call Vegetation Management's on-call supervisor in accordance with Grid Asset's procedures.

4.2. Remedial Action

In the event that the Vegetation Management supervisor finds an imminent threat to a transmission line, the supervisor shall inform Power System Operations (PSO), extension (916) 732-5964. This allows the power system operator to take necessary remedial actions such as de-rating the line or taking the line out of service.

4.3. Corrective Action

Vegetation Management will take corrective action to eliminate imminent threats to transmission lines as soon as practicable.

5. Regulatory Clearance Requirements

5.1. California Public Utilities Commission (CPUC)

California Public Utilities Commission, G.O. 95, Rule 35 has two clearance requirements. One clearance requirement addresses the minimum clearance between supply conductors and vegetation. A second requirement addresses the clearance at the time of trimming.

G.O. 95, Rule 35 Minimum Clearance: The CPUC sets the minimum radial clearance between line conductors and vegetation in Table 1, Case 13 of G.O. 95. Table 1, Case 13 for supply conductors between 22.5 kV and 300 kV to have a clearance requirement of ¼ of pin spacing shown in Table 2, Case 15. A note in Table 1, Case 13 requires a minimum clearance of 18 inches for 22.5 kV to 105 kV. Table 3, below, shows the clearance requirements for G.O. 95's Table 1 Case 13 requirements. See Table 2 of this document for distance required by G.O. 95's Table 2, Case 15.

Conductor voltage, kV	69 kV	115 kV	230 kV
Pin spacing from table, inches	48"	60"	90"
Adjustments, 0.4 inches per kV over 75 kV for 115 kV, or 0.4 kV inches per kV over 150 kV for 230 kV	na	16"	32"
Required pin spacing including adjustments	48"	76"	122"
¼ of pin spacing (radial clearance requirement between conductor and vegetation)	12"*	19"	30.5"
* 18 inches minimum required			

Table 4 G.O. 95 Rule 35 Clearance Requirements—Table 1, Case 13

Clearance at Time of Trimming: Excerpt from text of G.O. 95, Rule 35, Appendix E

The radial clearances shown below are the minimum clearances that should be established, at time of trimming, between the vegetation and the energized conductors and associated live parts where practicable. Vegetation management practices may make it advantageous to obtain greater clearances than those listed below:

Operating Voltage	Minimum Clearance
Radial clearance for any conductor of a line operating at 2,400 or more volts, but less than 72,000	4 feet
Radial clearance for any conductor of a line operating at 72,000 or more volts, but less than 110,000	6 feet
Radial clearance for any conductor of a line operating at 110,000 or more volts, but less than 300,000	10 feet

Table 5 G.O. 95 Minimum Clearance Requirements

5.2. California Resource Code (CRC), Excerpts

Section 4292: "any person that owns, controls, operates, or maintains any electrical transmission …shall …maintain …a firebreak which consists of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower"

Section 4293: "maintain a clearance of the respective distance which are specified in this section in all directions between all vegetation and all conductors which are carrying electric current:

(a) For any line which is operating at 2,400 or more volts, four feet.
(b) For any line which is operating at 72,000 or more volts, but less than 110,000 volts, six feet.
(c) For any line which is operating at 110,000 or more volts, 10 feet."

5.3. North American Reliability Corporation (NERC)

NERC Standard FAC-003-03 requires that a Transmission Owner determine and document the Minimum Vegetation Clearance Distances to be maintained for separation between a transmission conductor and vegetation. Table 2 presents tables and guidelines for determining clearance distances to maintain separation between vegetation and transmission conductors at all times. For compliance with FAC-003-3, SMUD's Imminent Threat Procedure provides guidance for the notification and mitigation of any vegetation condition which is likely to cause a fault at any moment. This includes vegetation which under observed conditions encroaches within the MVCD distances (Table 2)

5.4. SMUD Vegetation Management Clearances

SMUD's Vegetation Management uses clearance from the *Power Line Fire Prevention Field Guide* (CRC, Section 4293, Table 1). These clearances meet or exceed both *G.O. 95* requirements (Table 4) and the NERC Minimum Vegetation Clearance Distances (MVCD) requirements (Table 2).

Appendix C
Sensitive Plant Occurrence Discovery Record for the Upper American River Project Vegetation and Invasive Weed Management Plan

SENSITIVE PLANT OCCURRENCE DISCOVERY RECORD

_FESA-Listed CESA-Listed USFS Sensitive USFS Watch List

SCIENTIFIC NAME: OCCURRENCE ID:

SURVEYOR(S) INITIALS: JOB TITLE: DATE:

Location

COUNTY: OWNERSHIP:USGS QUAD:

SMUD FACILITY:

UTM (NAD83, Zone 10):

LOCATION/DIRECTIONS:

Occurrence

IS THIS A NEW OCCURRENCE, EXTENSION, or REVISIT?

INITIAL ID/MONITORING HISTORY/CNDDB OCCURRENCE:

AREA (ACRES OR METERS): DENSITY (#):

DESCRIPTION (PHENOLOGY, NUMBER OF PLANTS, AGE CLASS, DISPERSION, CHANGES IN OCCURRENCE, ETC.):

Habitat

ELEVATION (FT): ASPECT: %SLOPE:

LIGHT: MOISTURE: HUMUS/DUFF:

SOIL TYPE/TEXTURE (FIELD OR MAP DETERMINATION?):

TOPOGRAPHY:

REMARKS (MICROHABITAT, TIMBER TYPE, PLANT ASSOCIATES, ETC.):

DISTURBANCE/LAND USE/CHANGES IN SITE: (eg. OHV disturbance, timber harvest, invasive species, fire, etc):

PHOTO IDs (Habitat, Site features, Disturbance):

ADDITIONAL FIELD WORK NEEDED?

Appendix D
Invasive Weed Monitoring Form for the Upper American River Project Vegetation and Invasive Weed Management Plan

INVASIVE WEED MONITORING FORM

DATE:______________________ SURVEYOR(S): ____

SCIENTIFIC NAME:______________________________INFESTATION ID:_________________________

MANAGEMENT PRIORITY: HIGH ☐ MODERATE ☐ LOW ☐

SMUD FACILITY/DIRECTIONS TO INFESTATION:____

____

____

LAND OWNERSHIP:____________________________________ELEVATION:________________

UTM (NAD83, Zone 10):___________________

SITE DESCRIPTION/HABITAT: ____

____

____

APPROXIMATE SIZE OF INFESTATION: ___________________

COVER (%):_______________________ESTIMATED NUMBER OF INDIVIDUALS:____________

DISTRIBUTION: EVEN ☐ CLUMPED ☐ LINEAR ☐ PATCHY ☐ SINGLE PLANT ☐

PHENOLOGY: ROSETTE ☐ BOLT ☐ BUD ☐ FLOWER ☐ FRUIT ☐ SENESCENT ☐

*HORIZONTAL DIST. TO WATER:_________(FT.) *VERTICAL DIST. TO WATER:_________(FT)
*ONLY NEEDED IF INFESTATION IS WITHIN 500 FT. OF WATER

PHOTO ID'S (SITE LOCATION, HABITAT):

____

____

RECOMMENDED MANAGEMENT: ERADICATE ☐ CONTROL ☐ PREVENTION ☐

TREATMENTS: HAND PULL ☐ DIG UP ☐ CLIP FLOWER HEADS ☐
MECHANICAL REMOVAL ☐

NOTES:

____

____

Appendix E
Water Quality Monitoring Plan for the Upper American River Project Vegetation and Invasive Weed Management Plan

1.0 INTRODUCTION

The following WQMP is adapted from the PG&E, Mokelumne River Hydroelectric Project (FERC Project 137), Integrated Pest Management Plan approved in February 2016.

The aquatic and riparian buffers described in Section 5 of the VIWMP are based on site-specific human health and environmental risk assessments prepared for this project. Similar buffer widths have been used effectively for several hydroelectric projects throughout Region 5 including the El Dorado Irrigation District's El Dorado Hydroelectric Project (FERC No. 184), Integrated Pest Management Plan and PG&E's Mokelumne River Hydroelectric Project on the Eldorado National Forest and PG&E's Crane Valley Hydroelectric Project on the Sierra National Forest and PG&E's Rock Creek-Cresta Hydroelectric Project and Pit 3, 4, 5 Hydroelectric Project on the Plumas National Forest. Water Quality Monitoring has been conducted for all of these herbicide programs and in all but one instance there were no detected residues of herbicide in protected waters using similar stream buffers. The one instance where herbicide was detected was a result of human error during sampling collections.

Below is a summary of monitoring studies conducted in Region 5, which support the stream buffers identified in the VIWMP for glyphosate and triclopyr. These monitoring studies also support the idea of limiting the number of years of water quality sampling. The following paragraphs are based on the document entitled, *"A Review and Assessment of the Results of Water Monitoring for Herbicide Residues For the Years 1991 to 1999", USFS Region Five*, authored by David Bakke, Regional Pesticide-Use Specialist.

Region 5 Water Quality Monitoring Study: The study compiles and summarizes the results of fifteen separate water monitoring reports authored by hydrologists and geologists on the Angeles, Eldorado, Lassen, Sierra, and Stanislaus National Forests. These reports documented results from over 800 surface and ground water samples, as a result of reforestation and noxious weed eradication projects utilizing three herbicides (glyphosate, hexazinone, and triclopyr).

The report provides recommendations to reduce future water quality monitoring and sampling, primarily for ground-based applications of glyphosate and triclopyr on the westside of the Sierra Nevada. Subsequent studies and extensive monitoring data throughout Region 5 also suggest the established buffers are adequate and highlight there is no longer a need for extensive and expensive and automatic water quality sampling for other herbicides as well. The report concludes the following regarding stream buffers:

> **Triclopyr:** "It would appear from these monitoring data that untreated streamside buffers of greater than 15 feet in width reduce risk of water contamination to near zero, although it

should be noted that the 82 ppb transient level does not represent a substantial risk of harm to humans or the environment.

Glyphosate:”Based on monitoring to date, glyphosate applications, as generally practiced in reforestation projects, will not result in stream sediment or water contamination. With buffers as small as 10 feet, glyphosate was found to be non-detectable in collected samples."

1.1 WATER QUALITY MONITORING PLAN

The objectives of this monitoring plan are: 1) Per the Sierra Nevada Forest Plan Amendment – Riparian Conservation Objective #1 (SNFPA RCO #1) - Ensure that beneficial uses of the water body are adequately protected using the project stream buffers and BMPs; 2) Determine whether pesticides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects; 3) Document and provide early warning of possible hazardous conditions resulting from possible contamination of water or other non-target areas by pesticides; and 4) Document the results of the water quality monitoring program (reporting and evaluation).

To satisfy these four objectives outlined above, SMUD shall be responsible for water quality monitoring to ensure that pesticides prescribed and applied under the Vegetation and Invasive Weed Management Plan do not enter surface waters. SMUD proposes to implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and BMPs. SMUD will collect water samples within the Project area at the times and locations specified below.

Samples will be collected, stored and transported using EPA-approved procedures, including sampling chain of custody. All water samples will be tested at a California-certified laboratory. The laboratory ELAP number will be appended to each document. The water analysis will be carried out to determine if the prescribed herbicides and their associated breakdown products are present at detectable concentration.

1.2 SAMPLE METHOD

SMUD proposes to implement a minimum of one year of water quality monitoring of perennial streams that are adjacent to treated areas to document the effectiveness of proposed buffers and BMPs. SMUD will discontinue water quality monitoring following one year of monitoring for each pesticide as long as there are no positive detections of pesticides used on the Project. Additional monitoring will occur if new herbicides or new application techniques are proposed by SMUD and authorized by the ENF for use. If circumstances arise that trigger the need for additional monitoring, SMUD, in consultation with the ENF, will discuss additional survey and sample strategies.

A representative number of water samples will be collected above and below treated areas before and after pesticide applications and within 60 days of an application. Water monitoring is not proposed for reservoirs, forebays, canals or seasonal/intermittent streams within the Project area. The number of water samples collected will depend upon the size of the treatment area (treatment area will vary from year to year) and location of perennial streams within the treatment area. Pre-application samples will be taken no earlier than 2 weeks prior to the pesticide application. Post application samples will be taken within 24 hours of the first rain of greater than ½ inch within 60 days of a pesticide application.

All water samples shall be taken in 1-liter amber glass bottles that have been solvent-rinsed. Samples will be taken at a maximum distance of 0.25 miles above and below the application area and above any incoming tributary. All water samples will be taken in mid-channel (if possible depending upon flow and safety concerns) and as near to the mid-depth of the stream as possible. Sediment disturbance will be minimized and samples will be collected in flowing water (samples will not be taken in standing/stagnant water). The samples will be taken upstream from the sampler’s body to ensure no contact with the skin or clothing. A field blank will be provided from each sampling day to ensure that contamination of the sample bottles does not occur while in transit to and from the sample site. The samples will be retained in coolers at 4° C until they are delivered to the laboratory. All samples will be delivered to the analytical laboratory within 24-36 hours of sampling. Chain of custody (COC) documentation will follow the samples through the analytical process and a copy of the signed COC will be provided with the analytical report. The laboratory detection limits and full QA/QC documentation will be provided by the laboratory as a part of the results package. If the detection limits are not met or the results do not meet QA/QC requirements, the samples will be rerun.

If the water quality monitoring results detect the presence of pesticides, SMUD and the ENF will review and determine if it is necessary to modify components of the IPM Strategy regarding pesticide applications. If pesticides are detected, then water quality monitoring will continue until it is determined that the pesticide detections are not biologically relevant.

1.3 MONITORING LOCATIONS

A series of sample locations are to be determined by SMUD and the ENF as a component of the development of this plan. Sample locations will include perennial streams both upstream and downstream from treatment sites within the Project area. A representative and reasonable number of sampling sites will be identified that reflects cost, practical realities and results of previous sampling efforts. If an herbicide has been sampled for at least once in the year it was used and has not been detected in water samples, then no further monitoring for that herbicide will occur in future years unless there is evidence of off-site movement of that herbicide.

SMUD will include a map with their PUP and PCR submittal that shows the locations of the proposed water quality sample points. Sample locations will be established in non-target areas that are considered to have a high potential or are most likely to accumulate herbicide(s) in the event of contamination. One sample will be taken above and below a representative number of treatment sites. Sample locations will be a representative sample of perennial stream courses and soil types and be taken adjacent to areas to capture the variety of herbicides used that year.

Prior to the application of herbicides, pre-treatment samples will be collected to provide background or baseline information for the treatment area. Three replicate surface water samples will be collected at each monitoring location (number of monitoring locations to be determined upon approval of this plan) one time before pesticide applications and one after the applications to evaluate and determine whether off-site movement of chemical residue is occurring or if pesticides are already present within the Project area that are part of some other management activity on the ENF or adjacent private property.

1.4 PROJECT EVALUATION AND REPORTING

SMUD will keep on file all water quality monitoring records. Records will include the following information and documents for all monitoring locations: 1) maps of all treatment areas and monitoring stations; 2) sample documentation forms -"chain of custody forms"; 3) correspondence with labs; 4) information by unit on the dominant soil type of the unit and the date of treatment and 5) when the samples were collected in relation to the pesticide treatment date(s). The project file will also include all records of correspondence with organizations, groups and individuals concerning results of the water monitoring and other water quality issues.

Results of sample analysis are generally received within three weeks of delivery of the sample to the lab. The results of water quality monitoring will be shared with the ENF as soon as possible after the results are obtained from a certified lab. The results shall be included in the annual report. SMUD and the ENF will evaluate the monitoring results in terms of compliance with and adequacy of project specifications and to determine if results exceed thresholds established by the State Water Resources Control Board. Adjustments to the implementation of this document and any additional monitoring beyond the first year shall be made in coordination with the ENF and SMUD. In consultation with the ENF, application methods and/or stream buffers may be adjusted.

.

In each year in which water quality monitoring is conducted, the ENF will be provided with a brief water quality monitoring report, which includes (as applicable) the 'per site' findings of all previous years monitoring results, and also the next year's treatment proposal (as applicable). The annual summary report will include site specific information including coordinates/ maps of all sampling locations, information about conditions during field collection (e.g, when samples were first collected), EPA Standard Methods used for analysis, and laboratory results.

LITERATURE CITED

Bakke, D. 2001. A review and assessment of the results of the water monitoring for pesticide residues from the years 1991 to 1999. USFS Region 5.

USDA Forest Service. 2011. Region 5 Forest Service Handbook 2509.22, Soil and Water Conservation Handbook, Chapter 10, Water Quality Management Handbook. USDA Forest Service, Southwest Region, Vallejo, CA.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest Service Lands. Volume 1 National Core BMP Technical Guide. F2-990a.

Appendix F
Biological Evaluation/Biological Assessment For Terrestrial and Aquatic Wildlife

BIOLOGICAL EVALUATION/BIOLOGICAL ASSESSMENT FOR TERRESTRIAL AND AQUATIC WILDLIFE

SMUD VEGETATION AND INVASIVE WEED MANAGEMENT PLAN FOR THE UPPER AMERICAN RIVER PROJECT (UARP) FERC 2101, ELDORADO NATIONAL FOREST, PACIFIC RANGER DISTRICT

PROJECT LOCATION:
El Dorado County, California
T11N R11E 24-26
T11N R12E Sections 1, 10-16, 19–22, 28 & 29
T11N R13E Sections 1-8
T11N R14E Sections 1, 2, 6, 7, 12, 18
T11N R15E Sections 5–8
T12N R13E Sections 32–36
T12N R14E Sections 2–4, 8–11, 14–33, 35, 36
T13N R14E Sections 13–15, 22, 23, 26, 27, 34, 35
T13N R15E Sections 2–5, 7–9, 17, 18
T13N R16E Sections 6–9, 16, 17
T14N R15E Sections 33, 34
Mount Diablo Baseline and Meridian (MDB&M).

DATE: 9 October 2017 **REPORTER:** Holly Burger, Wildlife Biologist

Prepared By: Holly Burger, contractor for SMUD Title: Wildlife Biologist Date: 10/9/2017

Reviewed By: Nancy Nordensten Title: NEPA Coordinator, ENF Date: December, 2017

Approved By: ______________________Title___________________ Date: ___________

SMUD Contact: *Ethan Koenigs* Phone Number: *530-647-5094* Email: *ethan.koenigs@smud.org*

EFFECTS DETERMINATIONS

SMUD's Vegetation and Invasive Weed Management Plan (VIWMP) for the Upper American River Project (UARP) is not likely to result in a trend towards Federal listing or loss of viability of any of the sensitive terrestrial and aquatic wildlife species identified for the Project Area (Table 1).

Table 1. Effects determinations for threatened, endangered, or sensitive terrestrial and aquatic wildlife species that may occur in the Project Area.

Species	Scientific Name	Status (Federal/State)	Determination
Federally Listed Species			
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/–	No effect
Sierra Nevada yellow-legged frog	*Rana sierrae*	FE, FSS/ST	No effect
Forest Service Sensitive Species			
Western bumble bee	*Bombus occidentalis*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing
Hardhead	*Mylopharadon conocephalus*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Foothill yellow-legged frog	*Rana boylii*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Western pond turtle	*Actinemys marmorata*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Bald eagle	*Haliaeetus leucocephalus*	FD, FSS/SE, SFP	May affect individuals, but is not likely to result in a trend toward federal listing
Northern goshawk	*Accipter gentilis*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
California spotted owl	*Strix occidentalis occidentalis*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Willow flycatcher	*Empidonax traillii*	FSS/SE	No effect
Townsend's big-eared bat	*Corynorhinus townsendii*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Pallid bat	*Antrozous pallidus*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Fringed myotis	*Myotis thysanodes*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing
Sierra Nevada red fox	*Vulpes vulpes necator*	FSS/ST	No effect
Pacific marten	*Martes caurina*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing

FE = Federally Endangered; FD = Federally Delisted; FSS = Forest Service Sensitive; SE = State Endangered; ST = State Threatened; SCT = State Candidate Threatened; SSC = State Species of Special Concern

1 INTRODUCTION

1.1 Purpose

This Biological Evaluation/Biological Assessment (BE/BA) has been developed to review the VIWMP (Project) in sufficient detail to determine potential direct and indirect effects on Threatened, Endangered, or Sensitive (TES) terrestrial and aquatic wildlife species. TES species are defined as U.S Fish and Wildlife Service (USFWS) threatened, endangered, or proposed species, and those designated as “Forest Service Sensitive” (FSS) by the Pacific Southwest Region (Region 5) of the USFS. A separate document addresses sensitive plant species.

1.2 Location

The Project Area addressed by this BE/BA is defined as the UARP FERC boundary limited to USFS lands (Figure 1).

2 CURRENT MANAGEMENT DIRECTION

The overall management of sensitive wildlife species in the Eldorado National Forest (ENF) is dictated by the ENF Land and Resource Management Plan (1989) as amended in 2004 by the Sierra Nevada Forest Plan Amendment (USFS 2004). Management directives are guided by broad goals and strategies, species-specific land allocations and desired conditions, and various applicable standards and guidelines. Additional management direction for sensitive wildlife species is established by the License (FERC 2014) as well as SMUD’s proposed general conservation measures that were adopted under the UARP Biological Opinion (USFWS 2009). In general, the ENF is responsible for the implementing administrative measures to protect and improve the viability of endangered, threatened, rare, and sensitive wildlife species that may occur in the forest.

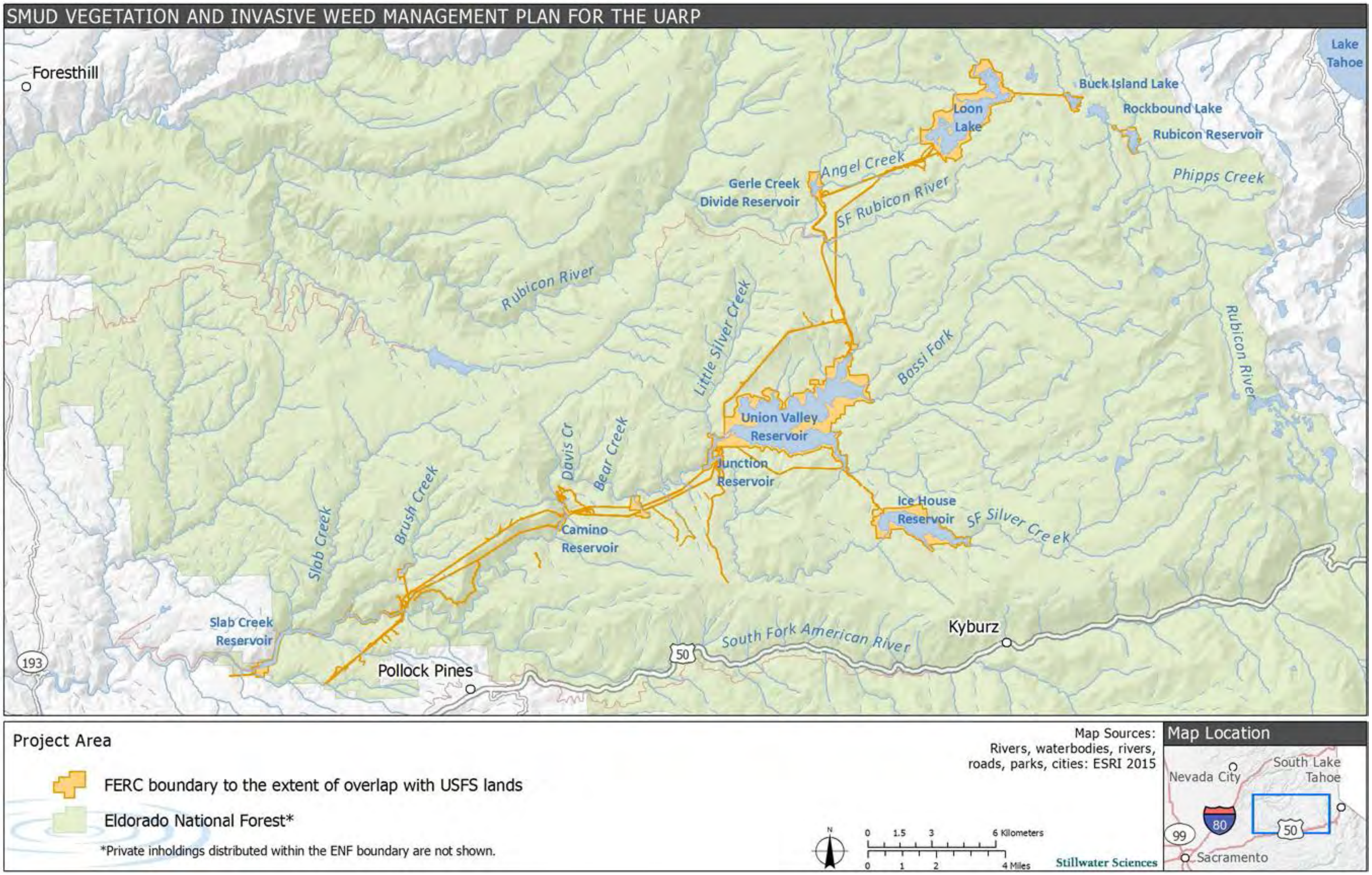


Figure 1. Project Area for the Terrestrial and Aquatic Wildlife Biological Evaluation/Biological Assessment for SMUD's Vegetation and Invasive Weed Management Plan for the UARP.

2.1 Sierra Nevada Forest Plan Amendment

The 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USFS 2004) lays out broad management goals and strategies for addressing five problem areas: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower west-side hardwood ecosystems. The two problem areas that are applicable to the Project Area include: (1) aquatic, riparian, and meadow ecosystems, and (2) lower west-side hardwood ecosystems.

2.1.1 Aquatic, Riparian, and Meadow Ecosystems

The Sierra Nevada Forest Plan Amendment was intended to provide regionally consistent direction to protect and restore desired conditions of aquatic, riparian, and meadow ecosystems in Sierra Nevada national forests and provide for the viability of species associated with those ecosystems.

The strategy for aquatic management describes broad goals which outline a comprehensive framework for establishing desired conditions at larger scales. These goals include maintaining and restoring the following:

- Water quality
- Species viability
- Plant and animal community diversity
- Special habitats
- Watershed connectivity
- Floodplains and water tables
- Watershed condition
- Streamflow patterns and sediment regimes
- Stream banks and shorelines

2.1.2 Lower West Side Hardwood Ecosystems

Goals for lower west side hardwood forest ecosystems under the Sierra Nevada Forest Plan Amendment (USFS 2004) include establishing and maintaining:

- a diversity of structural and seral conditions in landscapes in proportions that are ecologically sustainable at the watershed scale;
- sufficient regeneration and recruitment of young hardwood trees over time to replace mortality of older trees; and
- sufficient quality and quantity of hardwood ecosystems to provide important habitat elements for wildlife and native plant species.

2.1.3 USFS Species-Specific Land Allocations, Desired Conditions, and Standards and Guidelines

The Sierra Nevada Forest Plan Amendment (USFS 2004) relies on a network of land allocations and has an associated set of desired conditions, management intents, and management objectives. These three elements provide direction to land managers for designing and developing fuels and vegetation management projects. Species-specific land allocations, desired conditions, and standards and guidelines are included in the Sierra Nevada Forest Plan Amendment for northern goshawk, California spotted owl, and Pacific fisher.

2.1.3.1 Northern Goshawk

Land Allocations

The USFS is directed to establish and maintain 200-acre Protected Activity Centers (PACs) around all known and newly discovered breeding territories of northern goshawks on national forest lands within the Sierra Nevada (USFS 2004). PACs are intended to contain the best available nesting habitat in the largest contiguous blocks possible, based on aerial imagery. In patchy habitats, PACs are to consist of multiple patches greater than 30 acres within 0.5 miles of the nest site. Best available forest stands for PACs on the west side of the Sierra Nevada have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches diameter at breast height (dbh) or greater, and (2) stands have at least 70 percent tree canopy cover. Non-forest vegetation types (e.g., brush and meadows) are not counted as part of the 200 acres.

As additional nest location and habitat data become available, the USFS is directed to adjust PAC boundaries as necessary to better include the best available 200 acres. PACs are to be maintained regardless of occupancy status, unless the habitat is rendered unsuitable by a catastrophic stand-replacing event (e.g., fire) and there are no opportunities to remap the PAC in proximity to the affected PAC (USFS 2004).

Desired Conditions

The desired conditions for stands in each PAC include: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Standards and Guidelines

- Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately 0.25 miles of the nest site during the breeding season (15 February through 15 September) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a PAC is unknown, either apply the LOP to a 0.25 mile area surrounding the PAC, or survey to determine the nest stand location.
- The LOP may be waived for vegetation treatments of limited scope and duration, when a BE determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a BE concludes that a nest site will be shielded from planned activities by topographic features that will minimize disturbance, the LOP buffer distance may be modified.
- Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the acres in northern goshawk PACs in the 11 Sierra Nevada national forests.
- Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle (OHV) route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, OHV routes, and recreational and other developments for their potential to disturb nest sites.

2.1.3.2 California Spotted Owl

Land Allocations
California spotted owl PACs have been delineated on national forest lands since 1986. Current management direction (USFS 2004) requires 300-acre PACs around all known and newly discovered territories of California spotted owls on Sierra Nevada forests. PACs are intended to contain the best available habitat in as compact a unit as possible. Best available habitat in general includes: (1) two or more canopy layers; (2) dominant and co-dominant trees in the canopy averaging at least 24 inches dbh; and 3) at least 70 percent total canopy cover. As additional nest location and habitat data become available, the USFS is directed to adjust PAC boundaries as necessary to better include the best available 300 acres. PACs are to be maintained regardless of occupancy status, unless the habitat is rendered unsuitable by a catastrophic stand-replacing event (e.g., fire) and there are no opportunities to remap the PAC within a 1.5 mile radius to the affected PAC (USFS 2004).

Desired Conditions
The desired conditions for stands in each PAC include: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Standards and Guidelines

- Maintain a LOP, prohibiting vegetation treatments within approximately 0.25 miles of the activity center during the breeding season (1 March through 15 August), unless surveys confirm that California spotted owls are not nesting (as per *Guidance on Limited Operating Periods for the California Spotted Owl*, dated 6 April 2015).
- Prior to implementing activities within or adjacent to a California spotted owl PAC where the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.
- The LOP may be waived for vegetation treatments of limited scope and duration, when a BE determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a BE concludes that a nest site will be shielded from planned activities by topographic features that will minimize disturbance, the LOP buffer distance may be modified.
- Conduct vegetation treatments in no more than 5 percent per year and 10 percent per decade of the acres in California spotted owl PACs in the 11 Sierra Nevada national forests. Monitor the number of PACs treated at a bioregional scale.
- Mitigate impacts where there is documented evidence of disturbance to the nest site from proposals for new roads, trails, OHV routes, and recreational and other developments for their potential to disturb nest sites.

2.1.3.3 Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

The ENF Land and Resource Management Plan (USFS 1989) as amended in 2004 by the Sierra Nevada Forest Plan Amendment (USFS 2004) does not provide specific guidelines for the management of FSS bats, including pallid bat, Townsend's big-eared bat, and fringed myotis. These species are associated with oak woodlands, snags, rock outcrops, caves, bridges, abandoned mines, and riparian habitat. General Forest-wide Standards and Guidelines are expected to provide habitat to support viable populations of these species. Restoration of hardwood ecosystems is accomplished through standards and guidelines requiring retention of large live hardwood trees and snags and recruitment of young hardwood trees. Meadow and riparian habitats are restored and sustained through Standards and Guidelines implemented within 150 to 300 foot buffers along perennial and seasonally flowing streams, springs, lakes, and meadows.

2.2 UARP License

The 2014 UARP License includes the USFS 4(e) Final Terms and Conditions of the Federal Powers Act (FERC 2014), the UARP Mitigation Monitoring Plan in the Final California Environmental Quality Act (CEQA) Supplemental Analysis to the FEIS (SMUD 2008), and the State Water Resources Control Board (SWRCB) Section 401 Water Quality Certification and CEQA Mitigation Monitoring and Reporting Plan (SWRCB 2013a, b). The License requires specific actions to protect sensitive terrestrial wildlife species. The specific wildlife and plant protection measures listed below generally apply to the entire UARP and are applicable to the Project:

- Before commencing any new construction or maintenance (including but not limited to proposed recreation developments) authorized by the license on National Forest System lands that may affect a USFS, USFWS, or CDFW sensitive plant or wildlife species or its habitat, the licensee shall ensure that a BE (including necessary surveys) is completed that evaluates the potential effects of the action on the species or its habitat. The BE must be approved by USFS. In consultation with FERC, USFS, USFWS, or CDFW may require mitigation measures for the protection of sensitive species.
- If occurrences of USFS, USFWS, or CDFW sensitive plant or wildlife species are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, the licensee shall immediately notify USFS, CDFG, and USFWS. If USFS, USFWS, or CDFG determine that the Project-related activities are adversely affecting the sensitive species, the licensee shall, in consultation with USFS, CDFW, and USFWS, develop and implement appropriate protection measures.
- The licensee shall, beginning the first full calendar year after license issuance, in consultation with USFS, USFWS, and CDFW annually review the current list of special status plant and wildlife species (species that are Federal Endangered or Threatened, USFS Sensitive, or ENF Watch Lists) that might occur on National Forest System lands in the Project Area directly affected by Project operations. When a species is added to one or more of the lists, USFS, USFWS, and CDFW, in consultation with the licensee shall determine if the species or un-surveyed suitable habitat for the species is likely to occur on such National Forest System lands. For such newly added species, if USFS, USFWS, or CDFW determine that the species is likely to occur on such National Forest System lands, the licensee shall develop and implement a study plan in consultation with USFS, USFWS, and CDFW to reasonably assess the effects of the Project on the species. The licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to USFS, USFWS, and CDFW for review and approval. The licensee shall file the report, including evidence of consultation, with FERC and shall implement those resource management measures required by FERC.

3 EXISTING ENVIRONMENT

The list of TES species with the potential to occur in the vicinity of the Project Area was developed by querying or reviewing the following sources:

- USFWS Information for Planning and Conservation (IPaC) portal, to determine federally endangered and threatened species and Critical Habitat in the Project vicinity (USFWS 2017a);
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2017);
- the most current (2013) Region 5 Regional Forester's Sensitive Animal Species List (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5435266.xlsx); and
- biological resource surveys that were conducted as part of SMUD's FERC relicensing process for the UARP and Pacific Gas and Electric Company's Chili Bar Project (DTA 2004a–f, DTA and Santa Cruz Predatory Bird Research Group 2004, DTA and Stillwater Sciences 2005a–c).

The USFWS and CNDDB database queries were each based on a search of the U.S. Geological Survey (USGS) 7.5-minute quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

Spatial data for known occurrences of TES wildlife species were compiled and plotted in a Geographic Information System (GIS) (Figure 2). Sources of spatial data included the CNDDB (CDFW 2017), 2016 SMUD UARP monitoring results for amphibians, aquatic reptiles, and bald eagles, and PAC information from USFS (2012).

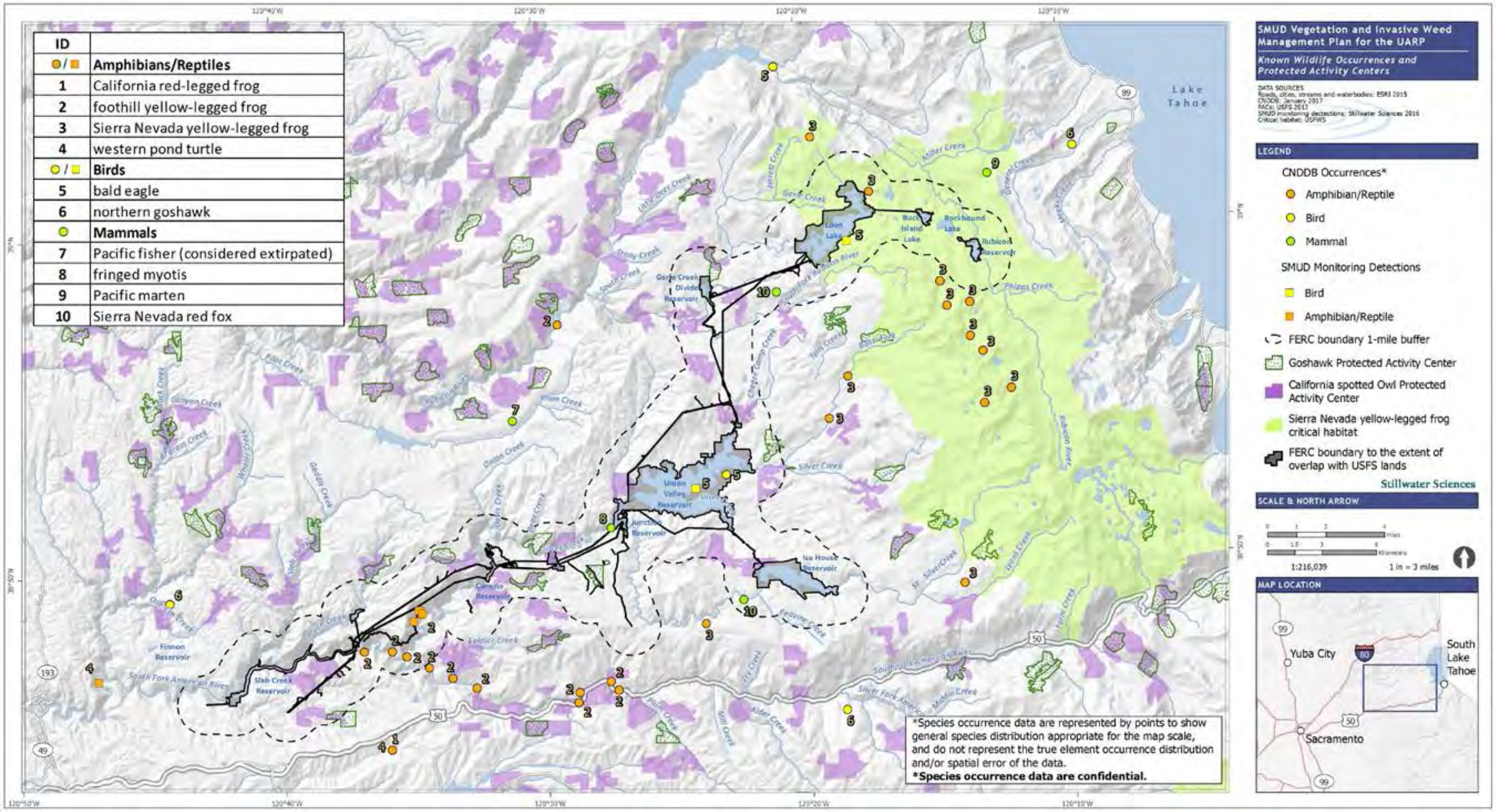


Figure 2. Known wildlife occurrences and Protected Activity Centers within a 1-mile buffer of the VIWMP Project Area. (SPECIES OCCURRENCE DATA ARE CONFIDENTIAL).

Although no species-specific wildlife surveys were conducted for this Project, a number of surveys conducted in the Project Area during relicensing of SMUD's UARP and/or Pacific Gas and Electric Company's Chili Bar Project were reviewed. These surveys included:

- valley elderberry longhorn beetle surveys conducted at UARP facilities below 3,000 ft elevation in 2002–2003 (DTA 2004a).
- reservoir and stream fish species composition and distribution surveys conducted in 2002–2004 (DTA and Stillwater Sciences 2005a, DTA and Stillwater Sciences 2005b);
- amphibian and aquatic reptile surveys conducted in 2002–2004 (DTA and Stillwater Sciences 2005c);
- bald eagle surveys conducted in 2002–2004 (DTA and Santa Cruz Predatory Bird Research Group 2004) and 2015–2016 (SMUD 2016);
- northern goshawk surveys conducted in 2002–2003 (DTA 2004b);
- California spotted owl surveys conducted in 2002–2003 (DTA 2004c);
- willow flycatcher nesting habitat surveys conducted in 2002 (DTA 2004d);
- bat trapping, roost surveys, and acoustic surveys conducted in 2002–2003 (DTA 2004e); and
- mesocarnivore habitat mapping conducted in 2002 (DTA 2004f).

Table 2 identifies the TES animal species that have potential to be present in the vicinity of the Project Area, and could therefore be affected by the Project. Of these species, only those with the potential to be affected by the Project are analyzed in detail. Appendix A (Animal Species Considered in the BE/BA) provides a list of all TES species that were considered to have the potential to occur[1] within the Eldorado National Forest or vicinity, including those that were eliminated from the need for detailed analysis based on rationale relating to habitat requirements and/or geographic range. If a species on the preliminary list requires habitat that is lacking from the Project Area or vicinity of the Project, or if the Project occurs outside the species' known range (including elevation range), the species was considered unlikely to occur and potential impacts to that species as a result of the proposed Project were not assessed.

Each of the species in Table 2 is discussed in detail below.

[1] A fisher was reported as observed crossing a road approximately 5 mi north of the Project Area in 1995 (CDFW 2017) (Figure 2). Zielinski et al. (1997) notes that misidentifying other species for fishers—especially marten—is common. The next closest documented sighting of a fisher, from 1972, is approximately 20 miles to the northeast, to the west of Lake Tahoe (CDFW 2017). An intensive survey effort during the early 1990s showed no verifiable evidence of fishers in the area extending from northeastern Shasta County south to Yosemite National Park, even though 66 track-plate surveys and 184 camera stations were deployed in this area (Zielinski et al. 1995, as cited in SMUD 2004). A scarcity of sightings in the northern Sierra Nevada over the last several decades suggests that fishers are likely extirpated from this area.

Table 2. Potential for Project-related effects on TES species that may occur in the vicinity of the Project Area.

Listed, proposed and/or sensitive species	Status[1] (Federal/ State)	Species habitat	Documented in the UARP?	Documented in the ENF?	Potential for effects[2]	
					Yes/No	No/Reason
Valley elderberry longhorn beetle	FT/–	Riparian and oak savanna habitats below 3,000 feet with host plant *Sambucus* sp. (blue elderberry)	Yes	No	No	This species occurs below 500 ft in elevation, which is outside of USFS lands
Western bumble bee	FSS/–	Uses flowering plants in meadows and forested openings; abandoned rodent burrows are used for nest and hibernation sites for queens	No	Yes	Yes	
Hardhead	FSS/SSC	Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity	Yes	Yes	Yes	
Sierra Nevada yellow-legged frog	FE, FSS/ST	Lakes, ponds, and streams in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats. **Proposed Critical Habitat:** Crystal Range Unit and Squaw Ridge Unit	No	Yes	No	No effect; species not present in the Project Area; Critical Habitat Primary Constituent Elements will not be impacted
Foothill yellow-legged frog	FSS/SSC	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate.	Yes	Yes	Yes	
Western pond turtle	FSS/SSC	Permanent and intermittent aquatic habitats including rivers, streams, lakes, and ponds, below 5,000 feet in elevation.	Yes	Yes	Yes	
Bald eagle	FD, FSS/SE, SFP	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests and winter communal roosts in advanced-successional conifer forest within 1.6 km (1 mi) of open water	Yes	Yes	Yes	
Northern goshawk	FSS/SSC	Forested habitats. Areas adjacent to known sightings or Goshawk Management Areas or Activity Centers.	Yes	Yes	Yes	
California spotted owl	FSS/SSC	Forested habitats. Areas adjacent to known sightings or Spotted Owl Habitat Areas,	Yes	Yes	Yes	

Listed, proposed and/or sensitive species	Status[1] (Federal/ State)	Species habitat	Documented in the UARP?	Documented in the ENF?	Potential for effects[2]	
					Yes/No	No/Reason
		Protected Activity Centers, or individual activity centers.				
Willow flycatcher	FSS/SE	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water.	No	Yes; only one willow flycatcher breeding territory located within the ENF	No	No effect; no willow flycatchers detected during relicensing surveys (DTA 2004d); only marginally suitable habitat within Project Area
Townsend's big-eared bat	FSS/SSC	Caves, mines or abandoned buildings and adjacent open, riparian and forest habitat to those features below 6,000 feet elevation.	No	Yes	Yes	
Pallid bat	FSS/SSC	Rock crevices, tree hollows (particularly hardwoods), mines, caves and abandoned buildings below 6,000 feet elevation (Philpott 1997, Barbour and Davis 1969).	No	Yes	Yes	
Fringed myotis	FSS/–	Crevices in rocks, cliffs, buildings, underground mines, caves, bridges, and in large, decadent trees. Most maternity colonies documented in California have been found in buildings.	Yes	Yes	Yes	
Sierra Nevada red fox	FSS/ST	High-elevation (from 5,000 feet to 7,000 feet); conifer forest, sub-alpine woodlands, and barren areas above treeline.	No	Yes	No	No effect; no known occurrences of Sierra Nevada red fox in the Project Area except anecdotal observations from 1972 and 1991
Pacific marten	FSS/–	High elevation (above 5,500 feet); mature mixed evergreen forests with 40% crown closure, large trees, and snags.	Yes	Yes	Yes	

[1]Status: FE = Federally Endangered; FD = Federally Delisted; FPT = Federal Proposed Threatened; FSS = Forest Service Sensitive; SE = State Endangered; ST = State Threatened; SCT = State Candidate Threatened; SSC = State Species of Special Concern

[2]See Section 5 for effects analysis

3.1 Valley Elderberry Longhorn Beetle

3.1.1 Distribution, Habitat, and Life History

The valley elderberry longhorn beetle is listed under the federal ESA as threatened. A California endemic species, the valley elderberry longhorn beetle is found in scattered populations throughout its range, which includes most of the Central Valley (Barr 1991).

Blue elderberry (*Sambucus nigra* subsp. *caerulea*) is the primary host plant for valley elderberry longhorn beetle. It is common along streambanks and in open places in forest throughout the California floristic province below 9,843 feet, and blooms from March to September (Baldwin et al. 2012). Larvae feed on tree pith, while adults eat the foliage and possibly the flowers of the plants. The adult stage of the valley elderberry longhorn beetle is short-lived, and most of the life cycle is spent in the larval stage (USFWS 1999). The adults are active from early March through early June with mating occurring in May (Barr 1991). Eggs are laid singly, or in small groups, in crevices in elderberry bark and hatch in about 10 days (Barr 1991). Larvae bore into the pith of elderberry roots, branches, and trunks to create an opening in the stem within which they pupate, remaining in this stage for one to two years before emerging as adults (Barr 1991, USFWS 1999). After metamorphosing into an adult, the beetle chews a circular exit hole through which it emerges, sometime during the period of late March to June (Barr 1991, USFWS 1999). It has been suggested that the beetle is a poor disperser, based on the spatial distribution of occupied shrubs (USFWS 1999).

The valley elderberry longhorn beetle appears to prefer larger, mature elderberry plants generally located below 500 ft elevation (USFWS 2017b). The USFWS Conservation Guidelines for the valley elderberry longhorn beetle consider plants with one or more stems measuring greater than or equal to 1 in in diameter to be potential habitat for the beetle (USFWS 2017b).

3.1.2 Occurrence in the Project Vicinity

During relicensing surveys, elderberry plants were found at eight sites along a transmission line corridor under 3,000 feet elevation (DTA 2004a). No elderberry plants were found at recreation access points or adjacent to any UARP dams, powerhouses, switchyards, or appurtenant facilities below 3,000 feet (DTA 2004a). In 2017, USFWS updated their framework for assessing impacts to the valley elderberry longhorn beetle and lowered the elevational limit for the species from 3,000 ft to 500 ft. The elderberry longhorn beetle does not occur in the Project Area since the ENF is located above 1,000 ft.

3.2 Western Bumble Bee

3.2.1 Distribution, Habitat, and Life History

Western bumble bee is designated as a Forest Service Sensitive (FSS) species. Once very common in the western U.S. and Canada, the western bumble bees have declined dramatically west of the Sierra-Cascade crest in the last 20 years. Western bumble bee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens (USFS 2014). This species uses flowering plants (such as *Melilotus*, *Cirsium*, *Trifolium, Centaurea*, *Chrysothamnus,* and *Eriogonum*) in flower-rich open grassy areas and forested openings, including montane meadows (Hatfield and LeBuhn 2007), urban parks and gardens, and chaparral and shrub areas (Williams et al. 2014, USFS 2014). Bumble bees do not depend on any one flower type, though some plants rely on bumble bees to achieve pollination. Underground cavities, primarily abandoned rodent burrows, are used for nest and hibernation sites for queens.

3.2.2 Occurrence in the Project Vicinity

Western bumble bee may occur in the Project vicinity. There are forested openings as well as many mesic to wet areas that consist of a mix of grasses and forbs. There are three western bumble bee records for the Eldorado National Forest (CDFW 2017).

3.3 Hardhead

3.3.1 Distribution, Habitat, and Life History

Hardhead is designated as a FSS species, and a California Species of Special Concern (SSC). Hardhead are widely distributed in low- to mid-elevation streams in the Sacramento- San Joaquin drainage. The hardhead range extends from the Kern River to the Pit River, and they are also present in the Russian River. In the San Joaquin drainage, hardhead is scattered in tributary streams and absent from valley reaches. In the Sacramento drainage, hardhead are present mostly in the Sacramento River and larger tributary streams. They are absent in San Francisco Bay streams except the Napa River (Brown and Moyle 1993, Moyle 2002, Saiki 1984). Hardhead tend to be absent in streams where introduced centrarchids (sunfishes) predominate, and streams that have been severely altered by human activity (Moyle 2002). Hardhead occur in streams that reach summer water temperatures greater than 68°F (20°C). Under laboratory conditions, their reported optimum water temperature range is 75.2°F to 82.4°F (24°C to 28°C) (Moyle 2002). Specialized habitat requirements combined with widespread alteration of lower watersheds has resulted in localized, isolated populations of hardhead (Moyle et al. 1995).

3.3.2 Occurrence in the Project Vicinity

Hardhead are present in the SF American River upstream and downstream of Slab Creek Reservoir, as well as in the reservoir itself (DTA and Stillwater Sciences 2005a, 2005b). Snorkel surveys conducted in the SF American River downstream of Slab Creek Reservoir revealed hardhead to be the most numerous species, though it was only in the lowest three miles of the reach where temperatures were presumably better suited for the species (Stillwater Sciences 2008).

3.4 Sierra Nevada Yellow-legged Frog

3.4.1 Distribution, Habitat, and Life History

Sierra Nevada yellow-legged frog (*Rana sierrae*) (SNYLF), formerly known as mountain yellow-legged frog (*Rana muscosa*), is now recognized as a separate species, as designated in Vredenburg et al. (2007). In April 2014, U.S. Fish and Wildlife Service listed SNYLF as federally endangered under the Endangered Species Act (USFWS 2014). SNYLF are also listed as threatened under the California Endangered Species Act and considered a FSS species. Critical Habitat for SNYLF has been delineated within the eastern portion of the UARP boundary, including Loon Lake and Rubicon River.

SNYLFs are found in deep, cold, perennial lakes, ponds, isolated pools, streams, and riverbanks in the Sierra Nevada Mountains at elevations typically ranging from 4,500 to 12,000 feet (USFWS 2014). During the active season, they prefer open, gently sloping shorelines with shallow water (2 to 3 inches deep) (Brown et al. 2014). Breeding activity begins soon after ice-melt in spring, ranging from April at lower elevations to June/July in higher elevations (AmphibiaWeb 2017). Eggs are deposited under water in clusters attached to rocks, gravel, vegetation, or under banks (AmphibiaWeb 2017). Permanent lakes or ponds that are deep enough as to not freeze to the bottom in winter or become anoxic (oxygen-depleted) may be required for breeding, because larvae require at least 2 to 3 years to reach metamorphosis (Matthews and Pope 1999). Successful breeding has rarely been observed in ponds less than 6.6 feet deep (Pope 1999, as cited in USFS 2014). SNYLFs also use streams, though little is known about the ecology of the species in stream habitats; anecdotal observations suggest that SNYLFs favor low- to moderate-gradient streams with low to moderate flows, perhaps due to scour risk at high flows (USFS 2014).

Typically, adults and larvae are found overwintering in lakes or ponds that are greater than 5.6 feet deep; however, adults have been known to emerge from waters in lakes less than 5 feet deep that were assumed to have completely frozen (Matthews and Pope 1999). In a high-elevation (11,380 feet) lake basin in Kings Canyon National Park, Matthews and Pope (1999) found post-metamorphic frogs in October, presumably exhibiting overwintering behavior, underwater in deep fractured bedrock crevices close to shore where water depths ranged between 0.7 feet and 4.9 feet. This suggests that at least some SNYLF adults overwinter in nearshore areas under ledges and in deep underwater crevices (it was previously assumed that adults may have exclusively used lake bottoms for overwintering) (Matthews and Pope 1999). Adults emerge from overwintering sites shortly after snow melts, and use rocks, crevices, ledges, or clumps of vegetation for cover (AmphibiaWeb 2017). SNYLFs appear to be absent from the smallest creeks, probably because these have insufficient depth for adequate refuge and overwintering (Jennings and Hayes 1994).

SNYLFs are highly aquatic, generally staying close to water and moving over a relatively small area. However, this species is capable of longer distance travel, typically along stream courses but also over dry land, in between habitats within lake complexes (Matthews and Pope 1999, USFWS 2016). The farthest reported distance for the species from water is 1,300 feet (Vredenburg et al. 2005). Stream corridors may be used for dispersal and adult frogs have been documented to move as much as 2 mi through stream systems within a single season (Wengert 2008, as cited in USFWS 2014). SNYLFs within habitat connected by lake networks or stream migration corridors display greater movement and home ranges; conversely, frogs located in a mosaic of fewer lakes or with greater distances between areas with high habitat value are not expected to move as far over dry land (USFWS 2016).

3.4.2 Occurrence in the Project Vicinity

SNYLFs have not been known historically or currently to occupy the reaches or reservoirs associated with the UARP Project (DTA and Stillwater Sciences 2005c). Visual encounter surveys were conducted for SNYLFs during relicensing efforts in 2003 and post-License monitoring surveys 2015 and 2017 (Table 3)(DTA and Stillwater Sciences 2005c, Stillwater Sciences 2015, Stillwater Sciences 2017). All surveys were conducted between the months of May and September, and survey conditions (e.g., weather, visibility) were suitable for detecting target amphibians. Loon Lake is located within designated USFWS Critical Habitat for SNYLF.

Table 3. Sierra Nevada yellow-legged frog survey sites in the UARP area, 2003–2017.

Site Code and Description	Survey Year	Number of Survey Visits
RR: Rubicon Reservoir margin	2003	2
RR-3: Rubicon River upstream of Rubicon Springs	2003	2
RR-4: Rubicon River downstream of Rubicon Springs	2003	2
Fox: Fox Lake margin	2003	1
RBR: Rockbound Reservoir margin	2003	2
RBP-1: Pond 1 near Rockbound	2003	1
RBP-2: Pond 2 near Rockbound	2003	1
RBP-3: Pond 3 near Rockbound	2003	1
RL-1: Highland Creek downstream of Rockbound Dam	2003	1
BIR: Buck Island Reservoir	2003	2
BI-3: Little Rubicon River downstream of Buck Island Dam	2003	2
LL-2: Loon Lake Reservoir at Toad Cove	2003	2
LL-4A: Loon Lake Reservoir	2003	1
LL-4B: Ellis Creek at Loon Lake Reservoir	2003	1
LL-8: Gerle Creek below cascade	2003	2
LL-10: Gerle Creek at Gerle Meadow	2003	2
LL-11A: Loon Lake Reservoir	2003	1
LL-11B: Unnamed tributary to Loon Lake Reservoir	2003	1
LL-P9: Loon Lake Reservoir Pond	2003	1
LL-P10: Loon Lake Reservoir Pond	2003	1
LL-P11: Loon Lake Reservoir Pond	2003	1
LL-P12: Loon Lake Reservoir Pond	2003	1
GC-6: SF Rubicon River upstream of Gerle Creek confluence	2003	2

Site Code and Description	Survey Year	Number of Survey Visits
GC-8: SF Rubicon River downstream of Forest Service road 13N29	2003	5
J-8: SF Silver Creek downstream of Peavine Creek	2003	2
IH-1: SF Silver upstream of Junction Reservoir	2003	3
IH-3A: SF Silver at burn area	2003	3
IH-3B: SF Silver at burn area	2003	3
UV-1: Jones Fork Silver Creek at Ice House Road	2003	5
UV-4A: Union Valley Reservoir margin	2003	3
UV-4B: Yellow Jacket Creek at Union Valley Reservoir	2003	3
Rubicon Reservoir shoreline near Rubicon Dam, and Rubicon River downstream of Rubicon Dam	2015	1
Buck Island Lake shoreline near Buck Island Dam, and Little Rubicon River downstream of Buck Island Dam	2015	1
Loon Lake Main Dam	2017	1
Loon Lake Dam Outlet	2017	1
Loon Lake Auxiliary Dam	2017	1
Loon Lake Helipad	2017	1
Loon Lake Meteorological Station	2017	1
Loon Lake Access Building and Switchyard	2017	1
Access Road to Loon Lake Switchyard	2017	1
Loon Lake Gate House and Access Road	2017	1
Access Road to Gerle Dam	2017	1
Gerle Dam	2017	1
Loon–Gerle Tunnel Area	2017	1
Gerle Quarry	2017	1
Gerle Canal	2017	1
Robbs Forebay Dam Area	2017	1

Site Code and Description	Survey Year	Number of Survey Visits
Robbs Peak Powerhouse and Switchyard	2017	1
Union Valley Dam	2017	1
Access Road to Union Valley Intake Structure and Dam	2017	1
Union Valley Intake Structure	2017	1
Union Valley Spillway	2017	1
Jones Fork Powerhouse and Switchyard	2017	1
Union Valley Bike Trail	2017	1
Ice House Dike	2017	1
Ice House Auxiliary Dam	2017	2
Ice House Main Dam and Spillway Access Road	2017	1
Ice House Spillway	2017	1
Ice house Access Road to Dam Outlet	2017	1
Ice House Intake Structure	2017	1
High Country Recreation Trail - above reroute	2017	1
High Country Recreation Trail - below reroute	2017	1

The closest documented occurrence of SNYLF near the Project Area is within 1,300 feet of Loon Lake, where one adult was detected in a small pond northeast of Loon Lake in 2004; none were detected during follow-up surveys at this location in 2005 and 2011 (CDFW 2017). The next closest detection is at an isolated pond located approximately 1.5 southwest of Rubicon Reservoir, where individuals were detected in 1997. At Lake Zitella and Highland Lake, located 1.5 and 2 miles, respectively, south of Rubicon Reservoir, numerous SNYLF of all life stages were detected as recently as 2013. Approximately 3 miles east of Union Valley Reservoir, one adult was detected in 1992 in Bassi Fork, a headwater stream connected to Union Valley Reservoir via Big Silver Creek (CDFW 2017). ENF and CDFW biologists have also found numerous SNYLF as recently as 2013 in McConnell Lake and Leland Lakes, between 2.5–3.5 miles south of Rubicon Reservoir. Lake Zitella, Highland Lake, McConnell Lake, and Leland Lakes are part of a complex of high-elevation (greater than 7,600 ft), predominantly exposed granite lakes located in the Desolation Wilderness, where SNYLF have been documented by ENF and CDFW biologists during multiple surveys as recently as 2013; each of these lakes eventually drains into either Rubicon or Rockbound reservoirs (CDFW 2017).

There is an estimated 38,870 ft of potentially suitable stream habitat within the UARP boundary. Of this, 11,750 ft is located within USFWS-designated Critical Habitat. These lengths are calculated by measuring all stream/tributary habitat (using the USGS National Hydrography Dataset [NHD]) above 4,500 ft elevation and within a 328-ft (100-m) buffer of Project reservoirs (i.e., measuring inlets and outlets of tributaries to reservoirs up to 328 ft [100 m]).

If a SNYLF is detected within the Project area, USFWS and USFS would be contacted immediately and consultation with the USFWS would be initiated.

3.5 Foothill Yellow-legged Frog

3.5.1 Distribution, Habitat, and Life History

Foothill yellow-legged frog (FYLF) is a FSS species and State SSC. Within California, FYLFs were historically found in the Sierra Nevada foothills, up to elevations of approximately 6,000 feet, and in the Coast Range from the Oregon border south to the San Gabriel River in southern California (Stebbins 2003). Currently, populations are thought to have disappeared from the southern Sierra Nevada foothills, in areas south of the Transverse ranges, and along the coast south of Monterey County (Jennings and Hayes 1994).

FYLFs are typically found in perennial streams or rivers, and intermittent creeks with pools. The species often breeds in low-gradient sections near junctions with tributary streams, due to the proximity of adult overwintering habitat in tributaries and to the presence of boulders and cobbles in these locations. Egg deposition usually occurs in cobble bars or under large boulders in areas of low-velocity flow. Tadpoles show affinity to the oviposition site, remaining in edgewater habitat with substrate interstices, vegetation, and/or detritus for cover. Adults prefer areas with exposed basking sites and cool, shady areas adjacent to the water's edge.

FYLF egg-laying (oviposition) typically begins during spring when flows diminish and average daily water temperatures consistently reach approximately 53–55 °F (12–13°C) (around April–May, depending on locale) (Kupferberg 1996). Warmer water temperatures accelerate egg mass development up to a critical thermal maximum temperature of 26°C (Duellman and Trueb 1986). Rainfall during the breeding season can delay oviposition (Kupferberg 1996). Eggs generally hatch within 5–37 days, depending on water temperatures (Zweifel 1955, Ashton et al. 1998). Tadpoles generally metamorphose within 3–4 months after hatching, prior to winter.

3.5.2 Occurrence in the Project Vicinity

Table 4 shows the results of surveys in the UARP area for FYLF during 2003–2004 relicensing surveys and during 2016–2017 post-License monitoring surveys. During 2016–2017 monitoring surveys, one FYLF was detected in Silver Creek below Camino Reservoir Dam near Camino Adit, as well as in a few wet off-channel and tributary areas near Camino Adit (SMUD 2017). During focused visual encounter surveys conducted in 2003–2004 during UARP relicensing studies, FYLF were documented at two sites in the UARP area: in Silver Creek below Camino Reservoir Dam (near Camino Adit, approximately 3.75 miles downstream of Camino Dam), and in Silver Creek just upstream of the confluence with the SF American River (DTA and Stillwater Sciences 2005c). In addition, there was an unconfirmed anecdotal sighting from 2003 along the South Fork American River downstream of Slab Creek Reservoir, near the confluence with Rock Creek. FYLFs were found in various locations along the South Fork American River near El Dorado Powerhouse and outside of the Project area in 2002 (CDFW 2017).

Table 4. Foothill yellow-legged frog survey sites and results in the UARP area, 2003–2017.

Site Code and Description	Survey Year(s)	Number of Survey Visits	Total Number of Foothill Yellow-legged Frogs Detected			
			Eggs	**Tadpoles**	**Subadults**	**Adults**
J-11: Silver Creek downstream of Junction Dam	2003–2004	1	-	-	-	-
J-12: Silver Creek 1 mile downstream of Junction Dam	2003–2004	1	-	-	-	-
J-13: Grey Horse Creek upstream of Silver Creek confluence	2003–2004	1	-	-	-	-
J-14: Unnamed tributary to Silver Creek, approximately 1 mile downstream of Junction Dam	2003–2004	1	-	-	-	-
J-15: Silver Creek upstream of Camino Reservoir	2003–2004	1	-	-	-	-
J-16: Little Silver Creek, approximately 0.5 miles upstream of Junction Reservoir	2003–2004	1	-	-	-	-
J-17: Little Silver Creek at Junction Reservoir	2003–2004	1	-	-	-	-
C-3: Silver Creek at Camino Adit	2003–2004	3	1	30	12	2
SFA-3: SF American River at El Dorado Powerhouse	2003–2004	3	4	1	5	1
SFA-4: Silver Creek at SF American Confluence	2003–2004	5	-	40	16	3
SFA-5: SF American River at Camino Powerhouse	2003–2004	1	1	-	-	-
BC-2: Brush Creek downstream of dam	2003–2004	3	-	-	-	-
SC-2A: SF American downstream of dam	2003–2004	3	-	-	-	-
SC-2B: Iowa Canyon Creek	2003–2004	3	-	-	-	-
SC-4: SF American River at White Rock Powerhouse	2003–2004	3	-	-	-	-
SC-6A: SF American River	2003–2004	3	-	-	-	-

Site Code and Description	Survey Year(s)	Number of	Total Number of Foothill Yellow-legged Frogs Detected			
SC-6B: Rock Creek at SF American River confluence	2003–2004	3	-	-	-	-
SC-7: SF American River at upstream of White Rock Powerhouse	2003–2004	1	-	-	-	-
SC-8: SF American River 1 mile downstream of Rock Creek	2003–2004	1	-	-	-	-
JD-A15: Silver Creek below Junction Reservoir Dam	2016	4	-	-	-	-
CD-A3: Silver Creek below Camino Reservoir Dam (near Camino Adit)	2016	7	-	-	-	1
CD-A4: Silver Creek below Camino Reservoir Dam (near confluence with SF American River)	2016	6	-	-	-	-
SCD-A1: SF American River below Slab Creek Reservoir Dam	2016	4	-	-	-	-
RC-A1: Rock Creek	2016	4	-	-	-	-
RPD-A1: SF Rubicon River below Gerle Creek	2016	1	-	-	-	-
JD-A15: Silver Creek below Junction Reservoir Dam	2017	3	-	-	-	-
CD-A3: Silver Creek below Camino Reservoir Dam (near Camino Adit)	2017	3	-	-	-	2
CD-A4: Silver Creek below Camino Reservoir Dam (near confluence with SF American River)	2017	3	-	-	-	-
RC-A1: Rock Creek	2017	3	-	-	-	-
SCD-A1: SF American River below Slab Creek Reservoir Dam	2017	2	-	-	-	-

3.6 Western Pond Turtle

3.6.1 Distribution, Habitat, and Life History

Western pond turtle (*Actinemys marmorata*) is a FSS species and State SSC. In California, this species is found from the Oregon border along the Pacific Coast Ranges to the Mexican border, and west of the crest of the Cascades and Sierras. Western pond turtles inhabit fresh or brackish water characterized by areas of deep water, low flow velocities, moderate amounts of riparian vegetation, warm water and/or ample basking sites, and underwater cover elements, such as large woody debris and rocks (Jennings and Hayes 1994). Along major rivers, western pond turtles are often concentrated in side channel and backwater areas. Turtles may move to off-channel habitats, such as oxbows, during periods of high flows (Holland 1994). Although adults are habitat generalists, hatchlings and juveniles require specialized habitat for survival through their first few years. Hatchlings spend much of their time feeding in shallow water with dense submerged or short emergent vegetation (Jennings and Hayes 1994). Although an aquatic reptile, western pond turtles require upland habitats for basking, overwintering, and nesting, typically within 0.6 mi from aquatic habitats (Holland 1994).

3.6.2 Occurrence in the Project Vicinity

Several western pond turtles have been documented in the UARP on the Slab Creek Dam Reach of the SF American River (DTA and Stillwater Sciences 2005c). The most recent sighting is on the SF American River downstream of Rock Creek in 2016 (SMUD, in prep.) While no western pond turtles were sighted during surveys conducted concurrently with amphibian studies during the SMUD relicensing process (DTA and Stillwater 2005c), there are other several past sightings along the SF American River. In 2003, three juvenile WPT were observed on the SF American River within the lower portion of the Slab Creek Dam reach by Jann Williams and Jens Hamar; one juvenile turtle was observed in August, approximately 0.5 mi upstream of White Rock Powerhouse, and two juveniles were observed in September just downstream of the Rock Creek confluence with the SFAR.

3.7 Bald Eagle

3.7.1 Distribution, Habitat, and Life History

Bald eagle is federally delisted, a FSS species, State-listed as endangered and State Fully Protected, and protected by the federal Bald and Golden Eagle Protection Act. This species is a year-round resident and uncommon winter migrant in California (Zeiner et al. 1990a). Breeding has been rebounding in the state during the last few decades; recent records document nesting in 41 of California’s 58 counties (CDFG 2009). Bald eagles breed at coastal areas, rivers, lakes, and reservoirs with forested shorelines or cliffs in northern California. Bald eagles winter throughout most of California in lower elevations, with large concentrations in the Klamath Basin (Zeiner et al. 1990a). The breeding season in California identified by the USFWS in the National Bald Eagle Management Guidelines extends from January through August (USFWS 2007); CDFW indicates that the season may extend through July or August (CDFW 2015).

Wintering bald eagles are associated with aquatic areas containing some open water for foraging. Bald eagles forage and scavenge within large bodies of water containing abundant fish, such as estuaries, coastal waters, rivers, large lakes, and reservoirs. While the bald eagles’ diets consist primarily of fish, they will also feed opportunistically on small mammals, birds, reptiles, and invertebrates. High snags, trees, and open rocky slopes provide hunting perches (Call 1978); open, easily approached perches and feeding areas are preferred.

The development of a bald eagle monitoring plan for the UARP is required within 6 months of license issuance under the License (FERC 2014). Management decisions affecting bald eagles is further directed by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA).

3.7.2 Occurrence in the Project Vicinity

Bald eagles have historically been documented nesting at Union Valley reservoir (at Granlees Point) and Loon Lake Reservoir (DTA and Santa Cruz Predatory Bird Research Group 2004, SMUD 2016). As recently as 2016, bald eagles nested at Union Valley Reservoir near Sunset Campground on Sunset Peninsula. Surveys were also conducted in 2016 at Ice House Reservoir and Loon Lake; there appeared to have been an unsuccessful nesting attempt at Loon Lake, and there was no nesting activity documented at Ice House Reservoir (SMUD 2016). Wintering and summer foraging bald eagles occur in other areas of the UARP as well.

3.8 Northern Goshawk

3.8.1 Distribution, Habitat, and Life History

Northern goshawk is FSS species and State SSC. This species is generally a year-round resident in California, but the species does exhibit some limited seasonal, altitudinal movements. The breeding stronghold is distributed across much of the northern Coast Ranges, the Klamath, Siskiyou, and Warner mountains, Cascades, Modoc Plateau, and through most of the Sierra Nevada (Keane 2008). The species nests in mature and/or old-growth forests, including within coniferous and mixed conifer-hardwood vegetation types; preferred stands are those with relatively large trees, high canopy cover, and an open understory (Keane 2008). Northern goshawk breeding in California typically begins during late spring or early summer (April to June), depending on the latitude (Zeiner et al. 1990a). Eggs are laid in mid-April to early May, incubation lasts about 30 days, and nestlings remain in the nest for 36 to 42 days, typically fledging from late June to late July. Goshawk territories are associated with larger patches of mature forest; occupancy of patches has been positively associated with patch area (Woodbridge and Detrich 1994). The breeding and nesting season occurs from between late March and mid- to late-August (Leslie in prep., as cited in USFWS 1998).

Often from a perching position in snags, the northern goshawk preys upon ground and tree squirrels, chipmunks, and a variety of bird species (e.g., robins, flickers, jays, etc.) (Squires and Reynolds 1997, Keane 2008). They are also known to feed on reptiles, insects, and occasionally carrion (Squires and Reynolds 1997). Many birds stay in their territories year-round, only leaving when prey is limited.

3.8.2 Occurrence in the Project Vicinity

Relicensing studies and ENF monitoring studies show that northern goshawks nest in the vicinity of the UARP (USFS 2004). There are an estimated 600 known goshawk territories on National Forest system lands in the Sierra Nevada, with about 70 of those occurring on the ENF. On the ENF, known goshawk sites appear to be fairly well-distributed across the forest, ranging between 4,000 and 7,000 feet in elevation (USFS 2004). Seven northern goshawk PACs are located within a 1-mile radius of the Project (Figure 2).

3.9 California Spotted Owl

3.9.1 Distribution, Habitat, and Life History

California spotted owl is a FSS species and State SSC. This species is a year-round resident in California, and breeds in the southern Cascades, the Sierra Nevada from Burney south, the Tehachapi Mountains, and the coastal range south of Monterey (Gutiérrez et al. 1995). California spotted owls typically occur in older forested habitats at elevations between 3,000 and 7,000 feet. They nest in complex stands with large trees dominated by hardwoods (primarily *Quercus* [oak] species), with conifer cover increasing with elevation (Gutiérrez et al. 1995). The species also requires some open areas for foraging as it hunts prey on the forest floor in woody debris. The California spotted owl's diet primarily consists of dusky-footed woodrat (*Neotoma fuscipes*) and northern flying squirrel (*Glaucomys sabrinus*), but they are also likely to feed on a variety of other small and medium-sized rodents, lagomorphs, birds, and bats. The California spotted owl breeding season is defined as 1 March through 15 August.

3.9.2 Occurrence in the Project Vicinity

Relicensing studies and ENF monitoring studies show that California spotted owl's nest in the vicinity of the UARP (USFS 2004). The USFS conducts ongoing, annual surveys in the ENF for California spotted owl, based on USFS-related projects currently in planning process during each year, and the University of Wisconsin conducts ongoing annual surveys in the Pacific Ranger District as part of a demographic population study (J. House, USFS, e-mail to H. Burger, Stillwater Sciences, on 16 March, 2017). The ENF occurs in the central portion of the California spotted owl's range and supports about 16% of the known population in the Sierra Nevada. On the ENF, spotted owls are known to occur between 2,000 and 7,200 feet in elevation. Twenty California spotted owl PACs are located within a 1-mile radius of the Project (Figure 2).

3.10 Willow Flycatcher

3.10.1 Distribution, Habitat, and Life History

Willow flycatcher is a FSS species and is State-listed as endangered. Although historically the willow flycatcher occurred throughout California in deciduous shrub and willow thicket habitats, it is currently only a rare summer resident in wet meadow and montane riparian habitats, at elevations of 2,000–8,000 feet, primarily in the Sierra Nevada and Cascade ranges (Craig and Williams 1998, Sedgewick 2000). Willow flycatcher is no longer present throughout most of its historical California range, but does rarely occur in riparian areas during the spring and fall migration periods.

Willow flycatchers require dense riparian shrubland, often thickets of willows or alder, near permanent standing water for foraging and roosting; however, areas with dense tree cover are not suitable. In addition, low, exposed branches are used during foraging (Zeiner et al. 1990a). Water is always present in willow flycatcher territories in California (Sedgewick 2000). Deciduous shrubs and small trees at least 6.6 feet tall are required for nesting (Craig and Williams 1998). Willow flycatcher nests are frequently parasitized by brown-headed cowbirds (*Molothrus ater*) (Craig and Williams 1998).

3.10.2 Occurrence in the Project Vicinity

No willow flycatchers were detected during protocol-level surveys conducted for UARP relicensing (DTA 2004d). Only marginally suitable habitat for willow flycatcher is available within Project Area. None of the meadows in the study area contain a significant shrub component and most lack willows (*Salix* sp.) entirely. A combination of poor habitat suitability, lack of willow flycatcher detections during the protocol-level surveys, and the absence of known willow flycatcher nesting territories in the vicinity of the UARP suggest that meadows in the study area cannot support willow flycatcher under current conditions. Additionally, only one meadow complex in the study area—at 38.8 acres—exceeds the 15-acre size criterion for “emphasis habitat” as defined in the Sierra Nevada Forest Plan Amendment (USFS 2004). Due to their absence from the Project Area, there will be no Project-related effects on willow flycatcher and this species is not discussed further.

3.11 Townsend’s Big-Eared Bat

3.11.1 Distribution, Habitat, and Life History

Townsend’s big-eared bat is a FSS species, a candidate for State listing as threatened, and a State SSC. This species occurs throughout California and is associated with caves and structures in a variety of habitats from deserts to coastal scrub to montane forests. Townsend’s big-eared bats have been documented from sea level to 10,800 feet, although in California maternity roosts appear to be confined to elevations below 5,900 feet (Pierson and Fellers 1998, Sherwin and Piaggio 2005).

This cavity-dwelling species roosts and hibernates in caves (commonly limestone or basaltic lava), mines, buildings, bridges (with a cave-like understructure), rock crevices, tunnels, basal hollows in large trees, and cave-like attics (Pierson and Fellers 1998, Pierson and Rainey 2007, Pierson et al. 2001, Pierson and Rainey 1996, Sherwin et al. 2000, Sherwin and Piaggio 2005). Townsend’s big-eared bats breed in both transitory migratory sites and hibernacula between September or October and February (CDFW 2013). The maternity season extends from 1 March through 31 October, with colonies forming between March and June and breaking up by September or October (CDFW 2013). Maternity colonies and winter hibernacula (found in caves, tunnels, mines, and buildings [Zeiner et al. 1990b]) are particularly sensitive to disturbance.

Townsend’s big-eared bat is a moth specialist with over 90% of its diet composed of lepidopterans. Foraging habitat associations include edge habitats along streams, adjacent to and within a variety of wooded habitats. These bats often travel large distances while foraging, including movements of over 150 kilometers during a single evening (Sherwin et al. 2000). Evidence of large foraging distances and large home ranges has also been documented in California (Pierson and Rainey 1996).

3.11.2 Occurrence in the Project Vicinity

No Townsend’s big-eared bats were documented during bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing in 2002–2003 (DTA 2004e). The closest documented occurrence of Townsend's big-eared bat is approximately 10 miles to the northwest of the UARP (CDFW 2017). While comprehensive surveys for this species have not been conducted in the Project Area, there are cliffs, rock crevices, snags, and tree hollows within the vicinity of the Project which may provide suitable day or night roosting habitat for this species. There are numerous caves and abandoned mines in El Dorado County that may provide suitable hibernacula, though none are known within or immediately adjacent to the Project Area.

3.12 Pallid Bat

3.12.1 Distribution, Habitat, and Life History

Pallid bat, a FSS species and State SSC, is fairly widespread in California. Pallid bats occupy a variety of habitats, from arid deserts to grasslands, to conifer forests and riparian areas. Roosts (including day, night, and maternity roosts) are typically located in rock crevices and cliffs; day roosts can also be found in tree hollows and caves (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996, Pierson et al. 2001). In more urban settings, roosts are frequently associated with human structures, such as abandoned buildings, abandoned mines, and bridges (Pierson et al. 1996, Pierson et al. 2001). Overwintering roosts require relatively cool and stable temperatures out of direct sunlight. Pallid bats typically glean prey from the ground, and may forage 1–3 mi from their day roosts (Zeiner et al. 1990b). Pallid bats eat a variety of insects and arachnids, including beetles, moths, spiders, and scorpions (Zeiner et al. 1990b).

The pallid bat is a colonial species, with a typical maternity colony size of 50 to 300 individuals (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996). Breeding occurs from late October to February. With an average litter size of two, the young are born between April and July, and are typically weaned in August (Sherwin and Rambaldini 2005). The maternity season extends from 1 May through 31 October and the hibernacula season includes 1 November through 1 April (WDFW 1994, as cited in WDFW 2004; Western Bat Working Group 2015).

3.12.2 Occurrence in the Project Vicinity

No pallid bats were documented during bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing in 2002–2003 (DTA 2004e). There are cliffs and rock crevices within river canyons, as well as snags and large tree hollows within the vicinity of the Project, which may provide suitable roosting habitat for this species.

3.13 Fringed Myotis

3.13.1 Distribution, Habitat, and Life History

Fringed myotis, a FSS species, is fairly widespread throughout the western United States and California. These bats occur primarily at middle elevations in desert, riparian, grassland, and woodland habitats, but they have been recorded at 9,350 feet in spruce-fir habitat in New Mexico, and at low elevations along the Pacific Coast (Barbour and Davis 1969, NatureServe Explorer 2015). Roosts are in caves, mines, cliff faces, rock crevices, old buildings, bridges, snags, and other sheltered sites (Barbour and Davis 1969, Weller and Zabel 2001, Lacki and Baker 2007). In spring and summer in northern California, the bats roosted in snags in early to medium stages of decay and switched roosts often (Weller and Zabel 2001). The maternity season extends from 1 April through 30 September (Zeiner 1990b; Herren and Luce 1997, as cited in Keinath 2003) and the hibernacula season includes 1 October through 31 March (Zeiner 1990b). Winter hibernacula are poorly known, but likely include caves, mines, and buildings. Diet includes various arthropods (especially moths and beetles, but also spiders) captured in flight or gleaned from plants. Foraging often occurs close to vegetative canopy (NatureServe Explorer 2015).

3.13.2 Occurrence in the Project Vicinity

During bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing, one fringed myotis was captured on 18 July 2002, at Silver Creek in the vicinity of the Junction Reservoir intake (DTA 2004e). There are also cliffs, rock crevices, snags, and tree hollows within the vicinity of the Project which may provide suitable roosting habitat for this species.

3.14 Sierra Nevada Red Fox

3.14.1 Distribution, Habitat, and Life History

The Sierra Nevada red fox, one of 10 subspecies of red fox in North America, occurs in two small and isolated populations in the Sierra Nevada mountains of California. Historically, the species is thought to have occupied the high elevation areas of the Sierra Nevada and Cascade mountain ranges from Tulare County, California, north to the Columbia River in Oregon. Currently the Sierra Nevada red fox's distribution is thought to be restricted to two small populations: one in the vicinity of Lassen Peak at the most southerly extent of the Cascades range, and one in the vicinity of Sonora Pass, approximately 160 miles to the south in the Sierra Nevada range. The Lassen Peak study (Perrine 2005) found that red fox distribution changed seasonally with movement in the winter at lower elevations down to 4,700 feet. In the summer, the foxes used higher elevations usually over 6,000 feet. Habitat used in the Lassen Peak region included barren, high-elevation conifer (red fir, sub-alpine conifer), mid-elevation conifer (lodgepole pine, Sierra mixed conifer, and white fir), shrub (montane chaparral), and hardwood-herbaceous (annual grassland, aspen, montane hardwood, montane riparian and wet meadow) (Perrine 2005).

While the Sierra Nevada red foxes' diet is primarily small rodents, they are often opportunistic predators and foragers, feeding on insects, berries, and other vertebrates, including deer carrion and lagomorphs in the winter.

3.14.2 Occurrence in the Project Vicinity

CNDDB lists two historic occurrences of Sierra Nevada red fox: anecdotal observations near Icehouse Reservoir from 1972, and a sighting along the road to Loon Lake in 1991 (CDFW 2017). Systematic follow-up surveys conducted by Zielinski from 1996–1999 using baited track plates and camera stations did not find evidence of this species (CDFG 2017). There are no other known occurrences of Sierra Nevada red fox in the UARP area, based on review of available literature resource databases as well as consultation with resource agency personnel; however, suitable habitat exists at higher elevations of the Project Area and the species may occur in very low numbers (DTA 2004f). Sierra Nevada red fox occurs most frequently above 7,000 feet elevation, which exceeds the maximum elevation of UARP facilities.

3.15 Pacific Marten

3.15.1 Distribution, Habitat, and Life History

Pacific marten is a carnivore that occupies high-elevation (5,000–10,000 feet), late-successional conifer forests in the Sierra Nevada (Spencer et al. 1983, Zielinski et al. 1995). Historically, the Sierra Nevada marten occurred from Trinity and Siskiyou counties east to Mt. Shasta and south through the Sierra Nevada to Tulare County (Kucera et al. 1995).

In the Sierra Nevada, marten maintain large home ranges in mature forests of lodgepole pine, red fir, and Sierran mixed conifer with complex ground structure (Zielinski et al. 1997). This species uses large diameter trees, snags, and down logs, with moderate-to-high canopy closure and an interspersion of riparian areas and meadows (USFS 2004). They generally avoid habitats that lack overhead cover. Various studies in the Sierra Nevada indicate that the marten has strong preferences for forest-meadow edges, and riparian forests appear to be important foraging habitats (Spencer et al. 1983, Martin 1987). Natal dens are typically found in cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas. Winter resting sites are typically in decayed wood beneath snow (Spencer 1987); summer resting sites are often in dense tangles of wind-thrown trees (Stone 2010) but also include live tree platforms, canopies, cavities, squirrel nests, logs, stumps, slash or log piles, tree root masses, shrubs, or rock or boulder piles.

Pacific martens are carnivorous, and primarily feed on small mammals like rodents, shrews, and lagomorphs on the ground as well as in trees. They are also seen eating fish, foraging for them along the edge of the water, and often eat birds, insects, and fruits outside of the winter season (Haley 1975 as cited by Zeiner et al. 1990b).

3.15.2 Occurrence in the Project Vicinity

The ENF has numerous records of marten from throughout the forest. Most of these observations are from the southwest corner of the Desolation Wilderness, but unverified observations have also been reported from near Ice House Road and upper Tells Creek (DTA 2004d). Suitable habitat is present throughout much of the Project Area located above 5,000 feet. CNDDB lists several marten observations on the Eldorado National Forest, predominantly above 6,000 feet in elevation (CDFW 2017).

4 EFFECTS OF THE PROPOSED PROJECT

This section discusses the potential effects of the Project on each of the TES terrestrial and aquatic wildlife species identified as most likely to occur in the Project Area using Risk Assessments (described in Section 5.1) and evaluating other feasible scenarios by which TES wildlife may be directly or indirectly affected. While SNYLF has not been documented in the Project Area, an evaluation of potential effects on the species is also included since Critical Habitat overlaps with the Project Area.

The primary scenarios in which the Project could directly or indirectly affect terrestrial wildlife resources are those involving both herbicide application or mechanical treatments, and include: (1) direct sprays or spray drift onto the animal, (2) consuming herbicide-contaminated water, prey, or plants, (3) removal of habitat elements that provide nesting, foraging, or resting (e.g., trees, shrubs), or (4) disturbance resulting from human presence and noise associated with vegetation management actions.

The primary scenarios in which the Project could directly or indirectly affect aquatic wildlife resources are those involving herbicide applications and the potential for these herbicides to enter the watercourses. These could include: (1) the accidental direct application or spill of herbicides, (2) herbicide drift from adjacent treated areas, (3) herbicide runoff or mobilization following rainfall, or (4) herbicides leaching into groundwater and entering the watercourse. Exposure of aquatic organisms to certain herbicides has been shown to result in effects to metabolism, growth, sexual development and reproduction, and mortality; however, in general, the active ingredients in herbicides are active against the metabolic activities of plants, not animals. The risk assessments provide the majority of this analysis.

4.1 Risk Assessments

An evaluation of the effects of herbicide application on TES terrestrial and aquatic wildlife species requires a careful assessment of risk to these species. The sections that follow include Risk Assessments for applying each of the nine herbicides proposed for use in the VIWMP.

Herbicide risk to wildlife depends upon both: (1) the toxicity of the herbicide to a particular receptor (organism) and (2) the degree of exposure of the organism to the material. The toxicity is determined by research trials during the development of the chemical or other studies designed to specifically identify the toxicity of the chemical on a particular reference taxon. Commonly, a Toxicity Reference Value (TRV) is determined using standard LD50 or LC50 values (Lethal Dose or Lethal Concentration at which 50 percent of the population experiences mortality) and applying an uncertainty factor or determining the No-Observed-Adverse-Effect Level (NOAEL), the maximum concentration at which no statistically significant adverse effects are observed in a population. These values are inherent to the chemical and its bio-activity and cannot be changed.

The other part of risk is likelihood of exposure, which is variable. One of the biggest factors affecting exposure levels in the application of herbicides is the application rate. Rates can be adjusted to the lowest levels possible while still meeting the objective of controlling vegetation. The application rate depends on many factors including, among others: growth stage of vegetation, desired ground conditions, application method and concentration of herbicide in solution. More importantly, other factors—which are in the control of the applicators—can be used to mitigate exposure levels. These are the Resource Protection Measures and BMPs that would be employed in the field. Of primary importance are buffers around sensitive sites, but other significant factors include: seasonal timing to avoid sensitive resources and application when conditions minimize movement from intended targets. The UARP VIWMP incorporates a large number of Resource Protection Measures and BMPs to reduce the exposure factor.

To assess the risk associated with the use of a specific pesticide, SMUD uses Risk Assessment Worksheets (WorksheetMaker, version 6.01.16), which are a computational tool developed by Syracuse Environmental Research Associates, Inc. (SERA) for the USFS. These are models that attempt to quantify the risk to various receptors based on TRVs and assumed exposure scenarios, which are typically very conservative and do not consider mitigating Resource Protection Measures employed by applicators. These worksheets are designed to facilitate risk assessment by comparing a potential exposure dose with the daily reference dose (RfD) established by the U.S. EPA (EPA). The RfD is a level of exposure at or below which no acute or chronic health effects are expected to occur; it can be considered the equivalent of an acceptable daily intake. Risk is expressed in the form of a hazard quotient, which is computed as the ratio of proposed exposure dose to the RfD. Hazard quotients ≤1.0 are considered by the USFS to pose insignificant risk to human health or the environment. That, however, is only a portion of the risk assessment process. Resource Protection Measures must be considered as well as other qualitative information specific to the Project.

For analyzing risk associated with the VIWMP, the following assumptions were incorporated into the SERA Risk Assessment Worksheets:

- Backpack directed foliar application (Backpack application models were used where available in the SERA worksheets since this is the most common type of application being proposed in the UARP; however, it should be noted that the backpack model uses a low boom application with fine-medium/coarse droplets anyways for off-target drift estimates.)
- Maximum application rates listed in Table 5
- A central application volume[2] of 20 gallons/acre
- One application at an interval of one day
- Pond surface area for spill of 1,000 square meters, at a depth of 1 meter
- Stream length of 1,038 feet and width of 6 feet, at a flow rate of 710,000 liters per day
- Chronic exposure length of 90 days

Table 5. Proposed Chemicals and Application Rates

Chemical	Proposed Maximum Application Rate
Aminopyralid	0.11 a.e. lb/ac
Chlorsulfuron	0.05 a.i. lb/ac
Clopyralid	0.14 a.e. lb/ac
Glyphosate	2 a.e. lb/ac
Imazapyr	0.33 a.e. lb/ac
Sulfometuron Methyl	0.14 a.i. lb/ac
Triclopyr (TEA)	2 a.e. lb/ac
Triclopyr (BEE)	2 a.e. lb/ac

Application rate units: acid equivalent pounds per acre (a.e. lb/acre) or active ingredient ponds per acre (a.i. lb/ac)

SERA states in their publication, Preparation of Environmental Documentation and Risk Assessments for the USFS, that a deeper understanding and appreciation of the qualitative discussion on risk may be more important than the numbers produced by the worksheets (SERA 2014). It is important to remember that many of the herbicides will be used in limited situations. For example, Sulfometuron Methyl will only be used in switchyards and around a limited number of other facilities where bare-ground conditions are desired and there are already limited chances for sensitive plants or animals to be nearby. Other herbicides like Clopyralid and Aminopyralid will be used to control certain difficult-to-control noxious weed species. Many of the herbicides proposed are approved for use in aquatic habitats and will often

[2] The central application volume is the most likely to be prescribed, and is therefore the volume that is assessed.

be applied in concentration volumes that fall within the lower to mid rates considered in the Risk Assessments, and then only to the lower 24 inches of vegetation to retard drift potential. In most cases where herbicides are being used in the UARP, applications will be made with backpack sprayers using medium-coarse droplets and targeted to specific types of plants so the chance for off-target impacts will be extremely low. Furthermore, review of the soils within the UARP (NRCS Soil Data for the ENF) indicates that the majority of soils in the Project Area consist of silts and loams with little pure clay soils, and runoff potential is reduced significantly on loam and sandy soils. Therefore, the chances for runoff-induced impacts would also be low.

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species, and are an important tool to mitigate potential adverse impacts to humans and natural resources. Dyes are not regulated as a pesticide and are not considered toxic to wildlife, plants or humans. Surfactants help the absorption of herbicide mixture into the plant. Competitor® (Wilbur-Ellis Company), the brand of surfactant to be used for the Project, is a modified vegetable oil containing a non-ionic emulsifier system. There is little information in the scientific literature on effects of seed-oil surfactants on aquatic organisms (Bakke 2007); since these products are derived from food grade vegetable oils, they are expected to have minimal, if any, effects on aquatic wildlife. Polyethoxylated tallow amines (POEAs), used in some herbicide formulations, are known to be toxic to fish and cause estrogenic effects in amphibians; these types of surfactants will not be used.

4.2 Direct and Indirect Effects

This section describes the potential for direct or indirect effects on aquatic and terrestrial TES wildlife species during implementation of the proposed Project. For each species or group of similar species, there is first an environmental risk assessment for each Project-specific herbicide, followed by an evaluation and discussion of the potential for Project-related effects.

4.3 Valley Elderberry Longhorn Beetle and Western Bumble Bee

In 2009, USFWS issued a BO on the Issuance of a New License for the UARP (USFWS 2009), which evaluated the effects of the UARP on valley elderberry longhorn beetle. The BO concluded that the UARP is not likely to jeopardize the continued existence of the valley elderberry longhorn beetle based on SMUD implementing annual employee awareness training, compliance with the USFWS Conservation Guidelines for the valley elderberry longhorn beetle (USFWS 1999), and compensation in the case of unavoidable loss of habitat. In 2017, USFWS updated their framework for assessing impacts to the valley elderberry longhorn beetle and lowered the elevational limit for the species from 3,000 ft to 500 ft. The valley elderberry longhorn beetle does not occur in the Project Area since the ENF is located above 1,000 ft. Therefore, the Project will have no effect on elderberry longhorn beetle.

Table 6 provides hazard quotients for acute exposure scenarios for western bumble bee. No chronic exposure scenarios were evaluated for terrestrial invertebrates because the opportunity for chronic exposure is extremely low.

Table 6. Hazard Quotients for Acute Exposure Scenarios for terrestrial invertebrates: western bumble bee[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Bee, 100% absorption	17.6	1,075	0.02	No
Chlorsulfuron	Bee, 100% absorption	76.9	25	3	Yes
Clopyralid	Bee, 100% absorption	22.4	909	0.02	No
Glyphosate (less toxic formulations)	Bee, 100% absorption	137.2	860	0.2	No
Imazapyr	Bee, 100% absorption	22.6	860	0.03	No
Sulfometuron methyl	Bee, 100% absorption	22.4	1,075	0.02	No
Triclopyr (BEE)	Bee, 100 % absorption	137	620	0.2	No
Triclopyr (TEA)	Bee, 100% absorption	137	620	0.2	No
Triclopyr (TCP)	NA	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

Direct effects on western bumble bee may occur if bees are directly sprayed with herbicide, or potentially if they foraged on recently treated flowering plants. The risk for direct effects on western bumble bee due to direct exposure to herbicides based on the derived hazard quotients for acute exposure scenarios is negligible for each Project herbicide, except for Chlorsulfuron (Table 6).

Chlorsulfuron exceeds the level of concern threshold for acute exposure scenarios for terrestrial invertebrates. However, the application period for Chlorsulfuron is November through March, which is outside of the blooming period for most flowering plants, and thus outside of the active western bumble bee foraging period. In addition, Chlorsulfuron is typically used as a pre-emergent and in bare ground treatments, thus no impacts on established forage plants would occur.

Western bumblebees could be indirectly affected by actions described in the VIWMP; if herbicide use eliminated important forage plants for bumblebees, populations could suffer. The UARP transmission corridor is maintained in an artificial, open canopy condition, which allows many species of herbaceous flowering plants to thrive with the increased sunlight, especially after thick brush removal. This open canopy condition with a variety of herbaceous, flowering plants provides good habitat for western bumblebees, which feed on many types of flowering plants. With the wire zone-border zone concept of vegetation management proposed in the VIWMP, SMUD will only use targeted applications of herbicides to maintain the open condition of the right-of-way. This strategy will continue to promote the growth of low-growing shrubs and herbaceous plants that will serve to increase forage for pollinators, including bumblebees. Additionally, SMUD's VIWMP will target invasive species within the right-of-way (and everywhere in the UARP), which will benefit the native plant species utilized by bumblebees. There will be no broadcast applications of herbicide that could lead to the loss of forage; therefore, the VIWMP may benefit bumblebee populations. Overall, the Project may affect individuals, but is not likely to result in a trend toward federal listing for western bumble bee.

4.4 Hardhead

Tables 5 and 6 provide hazard quotients for acute/accidental exposure scenarios and chronic exposure scenarios for hardhead.

Table 7. Hazard Quotients for Acute/Accidental Exposure Scenarios for sensitive fish species: hardhead[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Fish, sensitive species	0.07	50	0.001	No
Chlorsulfuron	Fish, sensitive species	0.03	30	0.001	No
Clopyralid	Fish, sensitive species	0.10	103	0.0009	No
Glyphosate (less toxic formulations)	Fish, sensitive species	1.36	0.5	3	Yes
Imazapyr	Fish, sensitive species	0.56	10.4	0.05	No
Sulfometuron methyl	Fish, sensitive species	0.10	7.3	0.01	No
Triclopyr (BEE)	Fish, sensitive species	1.36	0.09	15	Yes
Triclopyr (TEA)	Fish, sensitive species	1.36	20	0.07	No
Triclopyr (TCP)	Fish, sensitive species	0.01	0.18	0.03	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 8. Hazard Quotients for Chronic Exposure Scenarios for sensitive fish species: hardhead[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Fish, tolerant species	0.004	1.36	0.003	No
Chlorsulfuron	Fish, sensitive species	0.00003	3.2	0.000009	No
Clopyralid	Fish, sensitive species	0.001	10	0.0001	No
Glyphosate	Fish, sensitive	0.0004	0.5	0.0008	No

(less toxic formulations)	species				
Imazapyr	Fish, sensitive species	0.002	4	0.0006	No
Sulfometuron methyl	Fish, sensitive species	0.000006	1.17	0.000005	No
Triclopyr (BEE)	Fish, sensitive species	0.000004	0.019	0.0002	No
Triclopyr (TEA)	Fish, sensitive species	0.002	7.4	0.0003	No
Triclopyr (TCP)	Fish, sensitive species	0.0001	0.18	0.0006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Direct effects on hardhead associated with herbicide application would be in streams or reservoirs, namely the SF American River upstream and downstream of Slab Creek Reservoir, or in the reservoir itself. The risk for effects on hardhead from herbicides due to acute (accidental) or chronic exposure based on the derived hazard quotients is negligible (Tables 7 and 8), except for an exceedance in level of concern for acute (accidental) exposure to Glyphosate or Triclopyr (BEE). This risk assessment takes into consideration the worst-case circumstance by which exposure would occur; the scenarios where hazard quotients exceed a level of concern involve accidental exposure including large spills of 50 gallons of solution for the upper exposure levels, and subsequent daily exposure of target fish to large volumes of contaminated water for 90 days. However, the risk from an accidental spill of herbicide into a stream or reservoir in the Project Area is very low. In addition, this spill scenario is highly unlikely in the field because a majority of applications will be made using backpack applicators which have a capacity of three gallons. In addition, a 300-ft buffer from streams for application, mixing, and loading minimizes the possibility of occurrence of such accidental exposures.

Additional Water Quality Protection Measures (e.g., having a spill contingency plan, using ground-based application equipment, applying herbicide during favorable weather conditions, using low-pressure spray nozzles that produce large droplets, etc.) will also minimize the risk of herbicides to enter the SF American River in concentrations that could affect hardhead. Additionally, the large volume of water in the SF American River would further dilute any herbicide, if any unexpectedly reached the river either through a direct spill or through runoff. SMUD will also implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for hardhead.

4.5 Sierra Nevada Yellow-legged Frog and Foothill Yellow-legged Frog

Impacts on amphibians could occur during Project activities if these animals come into direct contact with herbicides during vegetation management within the UARP. Tables 9 and 10 provides hazard quotients for acute and chronic exposure scenarios for amphibians based on backpack directed foliar application. See the Risk Analysis section (4.1) for information on assumptions and surfactants.

Table 9. Hazard Quotients for Acute Exposure Scenarios for amphibians: Sierra Nevada yellow-legged frog and foothill yellow-legged frog (SERA 2007)[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Hazard Quotient[3]	Toxicity Value mg/kg	Exposure[2] Estimate mg/kg (Upper Limit)	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Amphibian, sensitive species	0.4996	0.005	95.2	0.666	0.007	No
Chlorsulfuron	Fish, sensitive species	0.0329	0.001	30	0.072	0.002	No
Clopyralid	Fish, sensitive species	0.0954	0.0009	103	0.208	0.002	No
Glyphosate (less toxic formulations)	Amphibian, sensitive species	1.3626	0.004	340	3.028	0.009	No
Imazapyr	Fish, sensitive species	0.5564	0.05	10.4	1.495	0.1	No
Sulfometuron methyl	Fish, sensitive species	0.0954	0.01	7.3	0.208	0.03	No
Triclopyr (BEE)	Amphibian, sensitive species	1.3626	**14**	0.1	3.028	**33**	**Yes**
Triclopyr (TEA)	Amphibian, sensitive species	1.3626	0.01	125	3.028	0.02	No
Triclopyr (TCP)	Fish, sensitive species	1.3626	**8**	0.18	6.056	**34**	**Yes**

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 10. Hazard Quotients for Chronic Exposure Scenarios for amphibians: Sierra Nevada yellow-legged frog and foothill yellow-legged frog[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exposure[2] Estimate mg/kg (Upper Limit)	Hazard Quotient3	Exceeds Level of Concern?
Aminopyralid	Amphibian, sensitive species	0.004	1.36	0.00005	0.029	0.0003	No
Chlorsulfuron	Fish, sensitive species	0.00003	3.2	0.000009	0.00004	0.00001	No
Clopyralid	Fish, sensitive species	0.001	10	0.0001	0.002	0.00008	No
Glyphosate (less toxic formulations)	Amphibian, sensitive species	0.00004	1.8	0.0002	0.012	0.006	No
Imazapyr	Fish, sensitive species	0.002	4	0.0006	0.040	0.01	No
Sulfometuron methyl	Fish, sensitive species	0.000006	1.17	0.000005	0.00001	0.000008	No
Triclopyr (BEE)	Fish, sensitive species	0.000004	0.019	0.0002	0.0001	0.007	No
Triclopyr (TEA)	Fish, sensitive species	0.002	7.4	0.0003	0.120	0.02	No
Triclopyr (TCP)	Fish, sensitive species	0.0001	0.18	0.0006	0.004	0.02	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

The risk for direct effects on SNYLF and FYLF due to direct exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios is negligible for each Project herbicide, except for acute effects from Triclopyr (BEE) (Tables 9 and 10). Because triclopyr BEE and TEA are relatively quickly metabolized to TCP (3,5,6-trichloro-2-pyridinol), which is also toxic to some organisms, it is considered in the risk assessments but it is not the active ingredient in any material that will be applied. Therefore, the analysis for triclopyr BEE serves as an analog for TCP. Of the herbicides proposed for use under the VIWMP, Triclopyr (BEE) has the most toxic properties for aquatic resources, and as such it will only be used in limited basal applications, and will not be used within 300 feet of manmade or natural watercourses (a list of watercourse buffers is provided in Table 11). In addition, spraying would not occur within 24 hours of a significant rain forecast of greater than a 30% chance of precipitation and would not occur when soils are saturated. The soils found in the Project Area are typically well-drained, which is conducive to herbicide leaching but not to transporting herbicides via runoff. The generally low organic component, in comparison to agricultural or grasslands, tend to create a low sorption potential, which when combined with higher permeability, could increase the potential for groundwater contamination (Huddleston 1996). Considering this, it is possible, though improbable, that Triclopyr (BEE) could contaminate groundwater and subsequently enter the watercourses in the Project Area. However, the use of backpack sprayers using target application instead of broadcast application, in combination with the herbicide exclusion buffers, should protect against this.

Table 11. Watercourse Buffers[1]

Herbicide[2]	Constructed Water Conveyance and Storage Structures[3]	Natural Watercourses[4]
Aminopyralid	25 feet	100 feet
Chlorsulfuron	25 feet	100 feet
Clopyralid	25 feet	100 feet
Glyphosate (less toxic/aquatic formulations)	10 feet	50 feet
Imazapyr	10 feet	50 feet
Sulfometuron methyl	25 feet	100 feet
Triclopyr (BEE)	300 feet	300 feet
Triclopyr (TEA)	10 feet	100 feet

[1] Buffer distances for aquatic features should be measured from the edge of the stream channel, or the edge of the special aquatic feature, or the extent of the wetted area, whichever is greater.
[2] Herbicide application within 300-ft of natural water courses water will be cut stump, hack and squirt, or direct foliar methods only.
[3] Man-made water conveyance or storage structures directly associated with engineered Project facilities, such as dams, groins, spillways, canals, flumes, weirs, etc.
[4] Natural watercourses are perennial or seasonal streams, wetlands, or intermittent channels

Glyphosate will often be used for vegetation treatments near water. There have been concerns regarding the toxicity of Glyphosate-based herbicides to amphibians because of internal surfactants—Polyethoxylated tallow amines (POEAs)—used in some formulations, which are known to be toxic to aquatic species like fish and amphibians. Rodeo/Aquamaster/Roundup Custom (the brand names of the glyphosate formulation to be used for the Project) do not include this surfactant. These brands represent the least toxic formations of glyphosate-based herbicides. Competitor®, the surfactant that will be used with glyphosate, was designed specifically for use in water and contains an alkyl ethoxylate instead of nonyl phenol ethoxylate (NPE), which is associated with endocrine disrupting effects in aquatic ecosystems. This will further mitigate risk associated with the use of glyphosate. Competitor has only slight acute toxicity to aquatic organisms, and it is one of the least-toxic surfactants used as an herbicide adjuvant (Pesticide Research Institute 2010). In addition, glyphosate rapidly and tightly binds to soil. As a result, glyphosate essentially becomes inactive as an herbicide upon contact with the soil. Due to this very high adsorption to soil, there is little potential for leaching or runoff; even when applied on asphalt or concrete the glyphosate that might runoff would enter the soil and quickly adsorb to soil particles. Glyphosate is so sensitive to soil, that excessive dirt or dust on the leaf at time of application, or the use of mixing water that is dirty or high in mineral content, can severely reduce the efficacy of the herbicide. Residue can be detected 60 days post-application although there is no herbicidal activity. Glyphosate is degraded via microbial activity. It has a half-life of 47 days, but immediate metabolites are more persistent with a 60-to-90-day half-life. Glyphosate is very persistent in water with a half-life of 12 days to 10 weeks. The presence of minerals or organic matter in water will tightly bind glyphosate, making it unavailable as herbicide, despite its persistence in the aquatic environment.

The probability that SNYLFs occur in the Project Area is very low, based on the lack of SNYLF detections during repeated visual encounter surveys conducted during relicensing surveys in 2003 and 2017 surveys in support of the VIWMP, as discussed in Section 3.4.2. Furthermore, SMUD will conduct surveys for SNYLF at all Project facilities located over 4,500 ft elevation where herbicide use is planned near water in 2018. Also, as part of License compliance, SMUD is developing and will implement a SNYLF Monitoring Plan through Year 2059, to continually update information regarding absence or future presence/distribution of the species, should they become established. If SNYLF are found within or near sites that are affected by UARP operations, then additional consultation with appropriate agencies would occur.

The Project will have no effect on SNYLF. There are no SNYLF detections within Project boundary from surveys during years 2003, 2015, and 2017. Project reservoirs within the FERC license boundary are unsuitable for SNYLF because they contain predatory fish. Were SNYLF to occur in the Project area, there is negligible risk for direct effects on SNYLF due to direct or indirect exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios for chemicals to be used at Project facilities near water (Tables 9 and 10). The single herbicide with a high hazard quotient and the most toxic properties for aquatic resources (Triclopyr BEE) will only be used in limited basal applications and will not be used within 300 feet of manmade or natural watercourses. Furthermore, vegetation treatments as Project facilities above 4,500 ft and near water are typically being implemented to maintain bare ground conditions near man-made structures that provide no or marginally suitable existing habitat conditions. No herbicide spraying will occur in the inlets to reservoirs, which are expected to be the most suitable for SNYLF, based on where the species is found in the nearby Desolation Wilderness Area. In addition, Resource Protection Measures for the Project provide additional assurances against any potential adverse effects (e.g., implementing herbicide exclusion buffers [Table 11], using ground-based application equipment, applying herbicide during favorable weather conditions, restricting applications during inclement weather or high winds, using low-pressure spray nozzles that produce large droplets, restricting application to the lowest 24 inches of vegetation, using spray guards when necessary, having a spill contingency plan, monitoring for sensitive amphibians, and water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures).

Loon Lake Reservoir and all aquatic features surrounding Loon Lake, as well as all aquatic features surrounding Buck Island Lake, Rubicon Reservoir, and Rockbound Lake (Rockbound Lake is near but outside of the Project) are located within USFWS Critical Habitat for SNYLF (USFWS 2016). The Primary Constituent Elements (PCEs) of Critical Habitat for SNYLF are: 1) aquatic habitat for breeding and rearing; 2) aquatic nonbreeding habitat, and 3) upland habitat (USFWS 2016). The Project would have no effect on USFWS designated Critical Habitat because no herbicides will be applied to aquatic habitat (potential breeding, rearing, and overwintering), and within upland areas, herbicide application would be restricted to developed sites that do not provide suitable habitat for SNYLF. No herbicide use will occur in the Desolation Wilderness Management Area, which represents a substantial amount of Critical Habitat within and near the Project. Application buffers and other design criteria would avoid indirect impacts to PCEs from herbicide (i.e. from herbicide drift, runoff, or leaching).

The Project may affect but is not likely to adversely affect FYLF. Effects on FYLF from the direct application of herbicides to watercourses (namely, Silver Creek and the SF American River, where FYLF are known to occur) are improbable under the Project because, as described in the VIWMP and listed in Table 11, herbicide exclusion buffers will be implemented for all watercourses. No application will occur within these buffers, and no herbicide batching (i.e., mixing and loading) will be allowed within 300 feet of any manmade or natural watercourse. Furthermore, any slight amounts of herbicides that may incidentally enter streams via runoff or leaching would be diluted and flushed downstream, particularly in the relatively high-discharge system of the South Fork American River. The manmade water conveyance and storage structures are managed to be devoid of vegetation. Prior to work on either manmade or natural watercourses, workers will be educated on sensitive frog identification to minimize the chance of herbicides being introduced to watercourse from contact with clothes/boots or from backpack sprayers. Buffers and other Resource Protection Measures (listed above) would mitigate against any significant effects on FYLF from herbicide drift, runoff, or leaching.

4.6 Western Pond Turtle

Tables 12 and 13 provide hazard quotients for acute and chronic exposure scenarios for reptiles.

Table 12. Hazard Quotients for Acute Exposure Scenarios for reptiles: western pond turtle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.004	14	0.0002	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.004	1,686	0.000003	No
Clopyralid	Consumption of contaminated	0.005	670	0.000007	No

	fish; fish-eating bird				
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.035	1,500	0.00002	No
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.014	2,510	0.000005	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.017	312	0.00005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0000003	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0004	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	0.00007	116	0.0000006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 13. Hazard Quotients for Chronic Exposure Scenarios for reptiles: western pond turtle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.0002	184	0.000001	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.000004	140	0.00000003	No
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.00005	15	0.000003	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.00001	58	0.0000002	No
Imazapyr	Consumption of contaminated fish; fish-eating	0.00006	610	0.00000009	No

	bird				
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.000001	2	0.0000005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.0000002	7.5	0.00000002	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.00008	7.5	0.00001	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

The risk for direct effects on western pond turtle (there is insufficient data available for a reptile risk assessment so fish-eating birds are used a surrogate) residing along the SF American River due to direct or indirect exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios is negligible for each Project herbicide. In addition, Resource Protection Measures for the Project (e.g., annual employee education and awareness training, a spill contingency plan, using ground-based application equipment, applying herbicide during favorable weather conditions, using low-pressure spray nozzles that produce large droplets, etc.) would further minimize the risk of herbicides to enter the South Fork American River in concentrations that could affect western pond turtle. SMUD will also implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for western pond turtle.

4.7 Bald Eagle

Tables 14 and 15 provide hazard quotients for acute and chronic exposure scenarios for bald eagle.

Table 14. Hazard Quotients for Acute Exposure Scenarios for fish-eating birds: Bald Eagle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.004	14	0.0002	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating	0.004	1,686	0.000003	No

	bird				
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.005	670	0.000007	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.035	1,500	0.00002	No
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.014	2,510	0.000005	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.017	312	0.00005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0000003	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0004	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	0.00007	116	0.0000006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 15. Hazard Quotients for Chronic Exposure Scenarios for fish-eating birds: Bald Eagle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.0002	184	0.000001	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.000004	140	0.00000003	No
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.00005	15	0.000003	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating	0.00001	58	0.0000002	No

	bird				
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.00006	610	0.00000009	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.000001	2	0.0000005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.0000002	7.5	0.00000002	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.00008	7.5	0.00001	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

Indirect effects on bald eagle could occur if they were to consume contaminated fish. However, the risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for bald eagle. Therefore, adverse effects on foraging or wintering bald eagle as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely.

Indirect effects on bald eagle could also occur if nesting habitat was removed or altered, or if nesting birds were disturbed by human activity (e.g., noise from chainsaws or trimmers during mechanical vegetation removal). Hazard tree removal includes the removal of trees that are a hazard to people, property or facilities (e.g., a tree that could fall and cause an outage). Bald eagle monitoring is required annually under SMUD’s Bald Eagle Monitoring Plan (SMUD 2015). These surveys would identify active nest trees, eliminating any chance of inadvertent removal and the subsequent loss of eggs or nestlings. If a nest is located within 0.25-miles of mechanical vegetation treatments that may potentially indirectly disturb nesting bald eagles during the breeding season, a no-disturbance buffer will be established in accordance with National Bald Eagle Management Guidelines (USFWS 2007) to minimize visual and auditory impacts associated with human activities. The size and shape of the buffer would vary depending on the topography and other ecological characteristics surrounding the nest site. As a result, direct effects on nesting bald eagle populations in the Project vicinity are unlikely. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for bald eagle.

4.8 Northern Goshawk and California Spotted Owl

Table 16 provides hazard quotients for acute (non-accidental) exposure scenarios for northern goshawk and California spotted owl. There is no data for a chronic exposure scenarios since a situation where meat eating birds would consume accidently treated mammals on a consistent and regular basis is not likely.

Table 16. Hazard Quotients for Acute (Non-Accidental) Exposure Scenarios for meat-eating birds: northern goshawk and California spotted owl[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of small mammal (after direct spray); carnivorous birds	0.355	14	0.03	No
Chlorsulfuron	Consumption of small mammal (after direct spray); carnivorous birds	0.155	1,686	0.00009	No
Clopyralid	Consumption of small mammal (after direct spray); carnivorous birds	0.452	670	0.0007	No
Glyphosate (less toxic formulations)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	1,500	0.004	No
Imazapyr	Consumption of small mammal (after direct spray); carnivorous birds	1.07	2,510	0.0004	No
Sulfometuron methyl	Consumption of small mammal (after direct spray); carnivorous birds	0.425	312	0.001	No
Triclopyr (BEE)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	126	0.05	No
Triclopyr (TEA)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	126	0.05	No
Triclopyr (TCP)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	116	0.06	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.

[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.NA= Data is Not Available

The risk characterization for the Project herbicides does not exceed the level of concern for any exposure scenarios likely for northern goshawk or California spotted owls. Therefore, adverse effects to northern goshawk or spotted owls as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely.

Other potential Project-related impacts could result from noise-generating activities, such as chainsaw or trimmer operations in the vicinity of active nests. Impacts could also result from hazard tree removal at or near a nest site. Such disturbance during the nesting season can result in nest site failure or abandonment. Resource Protection Measures include confirming the location of nests or activity centers, establishing no-disturbance buffer zones around the nest site or activity center during the breeding season, or postponing construction until after the end of the nesting season (15 February through 15 September for northern goshawk, and 1 March through 15 August for California spotted owl) or after the nestlings have fledged. With implementation of these Resource Protection Measures, nesting northern goshawks or California spotted owl would have little or no awareness of Project activities. The potential for direct effects on California spotted owl is further reduced since the owl is mostly nocturnal and Project activities will be during the day.

The Project may affect individuals, but is not likely to result in a trend toward federal listing for northern goshawk or California spotted owl.

4.9 Townsend's Big-Eared Bat, Pallid Bat, and Fringed Myotis

Table 17 provides hazard quotients for acute (non-accidental) exposure scenarios for special-status bat species with potential to occur in the Project Area.

Table 17. Hazard Quotients for Acute (Non-Accidental) Exposure Scenarios for small mammals: bats (Townsend's Big-Eared Bat, Pallid Bat, and Fringed Myotis)[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Small mammal, contaminated insects	2.12	104	0.02	No
Chlorsulfuron	Small mammal, contaminated insects	0.925	75	0.01	No
Clopyralid	Small mammal, contaminated insects	0.452	75	0.04	No
Glyphosate (less toxic formulations)	Small mammal, contaminated insects	38.5	500	0.08	No
Imazapyr	Small mammal, contaminated insects	6.36	738	0.009	No
Sulfometuron methyl	Small mammal, contaminated insects	2.7	312	0.02	No

Triclopyr (BEE)	Small mammal, contaminated insects	38.5	440	0.09	No
Triclopyr (TEA)	Small mammal, contaminated insects	38.5	440	0.09	No
Triclopyr (TCP)	Small mammal, contaminated insects	5.48	25	0.2	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on bats could occur if they were to consume contaminated insects, or if their insect prey base was reduced as a result of reduction in available habitat. The risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for bats. Therefore, adverse effects on FSS bat species as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely. The effect to prey habitat would be negligible, since treatment of vegetation would be restricted to areas surrounding facilities, along transmission ROWs, and along roadside shoulders and trails; habitat for bat prey species, primarily arthropods (including but not limited to butterflies, moths, beetles, spiders, etc.) is abundant in the Project area and would not be affected by maintenance of these areas.

Direct effects on bats could occur if hazard trees that provide bat roosting habitat were removed. Bats may also be indirectly affected by noise from equipment such as chainsaws or trimmers. Bat life history stages with the most sensitivity to disturbance are winter hibernation and breeding/rearing offspring. While Townsend’s big-eared bat, pallid bat, and fringed myotis may use large tree cavities for day or night roosts, these species will typically use caves, tunnels, mines, and/or buildings for winter hibernacula or maternity colonies. Therefore, hazard tree removal will not likely affect bats during these sensitive time periods. Any bats potentially using hazard trees as day or night roosts would be able to leave the area unharmed during tree removal activities. The Project Area has a great deal of snags and fractured rock walls that would be suitable for roosting bats that may be displaced by the Project. Noise disturbance from equipment is expected to occur in areas where there is already an existing level of background human presence and disturbance, and is furthermore expected to be of very short intensity and duration.

The Project may affect individuals, but is not likely to result in a trend toward federal listing for Townsend’s big-eared bat, pallid bat, or fringed myotis.

4.10 Sierra Nevada Red Fox

Tables 18–20 provide hazard quotients for acute (accidental), chronic, and acute (non-accidental) exposure scenarios for Sierra Nevada red fox.

Table 18. Hazard Quotients for Acute (Accidental) Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Canid, contaminated water	0.005	104	0.00005	No
	Canid, contaminated fish[4]	0.003	104	0.00002	No
Chlorsulfuron	Canid, contaminated water	0.003	75	0.00004	No
	Canid, contaminated fish[4]	0.004	75	0.00005	No
Clopyralid	Canid, contaminated water	0.008	75	0.0001	No
	Canid, contaminated fish[4]	0.004	75	0.00005	No
Glyphosate (less toxic formulations)	Canid, contaminated water	0.115	500	0.0002	No
	Canid, contaminated fish[4]	0.030	500	0.00006	No
Imazapyr	Canid, contaminated water	0.047	250	0.0002	No
	Canid, contaminated fish[4]	0.012	250	0.00005	No
Sulfometuron methyl	Canid, contaminated water	0.008	87	0.00009	No
	Canid, contaminated fish[4]	0.014	87	0.0002	No
Triclopyr (BEE)	Canid, contaminated water	0.115	20	0.006	No
	Canid, contaminated fish[4]	0.048	20	0.002	No
Triclopyr (TEA)	Canid, contaminated water	0.115	20	0.006	No
	Canid, contaminated fish[4]	0.048	20	0.002	No
Triclopyr (TCP)	Canid,	0.0005	25	0.00002	No

	contaminated water				
	Canid, contaminated fish[4]	0.0002	25	0.000008	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
[4] Contaminated fish are used as a conservative surrogate for contaminated small mammals (primary prey species for fox), which were not available as an option in this exposure scenario

Table 19. Hazard Quotients for Chronic Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Canid, contaminated water	0.0004	50	0.000007	No
	Canid, contaminated fish[4]	0.0002	50	0.000004	No
Chlorsulfuron	Canid, contaminated water	0.000002	5	0.0000005	No
	Canid, contaminated fish[4]	0.000003	5	0.0000006	No
Clopyralid	Canid, contaminated water	0.00008	15	0.000006	No
	Canid, contaminated fish[4]	0.00004	15	0.000003	No
Glyphosate (less toxic formulations)	Canid, contaminated water	0.00003	500	0.00000006	No
	Canid, contaminated fish[4]	0.000008	500	0.00000002	No
Imazapyr	Canid, contaminated water	0.0002	250	0.0000008	No
	Canid, contaminated fish[4]	0.00005	250	0.0000002	No
Sulfometuron methyl	Canid, contaminated water	0.0000005	2	0.0000002	No
	Canid, contaminated fish[4]	0.0000008	2	0.0000004	No
Triclopyr (BEE)	Canid,	0.0000003	1	0.0000003	No

	contaminated water				
	Canid, contaminated fish[4]	0.0000001	1	0.0000001	No
Triclopyr (TEA)	Canid, contaminated water	0.0002	1	0.0002	No
	Canid, contaminated fish[4]	0.00007	1	0.00007	No
Triclopyr (TCP)	Canid, contaminated water	0.000008	12	0.0000007	No
	Canid, contaminated fish[4]	0.000004	12	0.0000003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
[4] Contaminated fish are used as a conservative surrogate for contaminated small mammals (primary prey species for fox), which were not available as an option in this exposure scenario

Table 20. Hazard Quotients for Acute (Non-accidental) Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Small mammal; direct spray	0.299	104	0.003	No
	Contaminated fish; overspray	0.0005	104	0.000005	No
Chlorsulfuron	Small mammal; direct spray	0.130	75	0.002	No
	Contaminated fish; overspray	0.0005	75	0.000007	No
Clopyralid	Small mammal; direct spray	0.380	75	0.005	No
	Contaminated fish; overspray	0.000	75	0.000002	No
Glyphosate (less toxic formulations)	Small mammal; direct spray	5.43	500	0.01	No
	Contaminated fish; overspray	0.0005	500	0.000001	No
Imazapyr	Small mammal; direct spray	0.896	250	0.004	No
	Contaminated fish; overspray	0.0001	250	0.0000006	No
Sulfometuron methyl	Small mammal; direct spray	0.380	87	0.004	No
	Contaminated fish; overspray	0.00002	87	0.0000002	No

Triclopyr (BEE)	Small mammal; direct spray	5.43	20	0.3	No
	Contaminated fish; overspray	0.00003	20	0.000001	No
Triclopyr (TEA)	Small mammal; direct spray	5.43	20	0.3	No
	Contaminated fish; overspray	0.0002	20	0.00001	No
Triclopyr (TCP)	Small mammal; direct spray	5.43	25	0.2	No
	Contaminated fish; overspray	0.00007	25	0.000003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on Sierra Nevada fox could occur if they were to consume contaminated prey items (e.g., small mammals) or drink contaminated water. However, the risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for canids. Furthermore, no resident populations of Sierra Nevada red fox are known to be present in the Project Are or Eldorado National Forest. Therefore, the Project will have no effect on Sierra Nevada red fox.

4.11 Pacific Marten

Tables 21 and 22 provide hazard quotients for acute (accidental) and chronic exposure scenarios for Pacific marten.

Table 21. Hazard Quotients for Acute (Accidental) Exposure Scenarios for larger mammals: Pacific marten[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Larger mammal, contaminated water	0.007	104	0.00006	No
Chlorsulfuron	Larger mammal, contaminated water	0.004	75	0.00005	No
Clopyralid	Larger mammal, contaminated water	0.010	75	0.0001	No
Glyphosate (less toxic formulations)	Larger mammal, contaminated water	0.115	500	0.0003	No
Imazapyr	Larger mammal,	0.060	738	0.00008	No

	contaminated water				
Sulfometuron methyl	Larger mammal, contaminated water	0.010	87	0.0001	No
Triclopyr (BEE)	Larger mammal, contaminated water	0.148	100	0.001	No
Triclopyr (TEA)	Larger mammal, contaminated water	0.148	100	0.001	No
Triclopyr (TCP)	Larger mammal, contaminated water	0.0006	25	0.00003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 22. Hazard Quotients for Chronic Exposure Scenarios for larger mammals: Pacific marten[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Larger mammal, contaminated water	0.0005	50	0.00001	No
Chlorsulfuron	Larger mammal, contaminated water	0.000003	5	0.0000004	No
Clopyralid	Larger mammal, contaminated water	0.0001	15	0.000007	No
Glyphosate (less toxic formulations)	Larger mammal, contaminated water	0.00004	500	0.00000008	No
Imazapyr	Larger mammal, contaminated water	0.0003	738	0.0000005	No
Sulfometuron methyl	Larger mammal, contaminated water	0.0000006	2	0.0000003	No
Triclopyr (BEE)	Larger mammal, contaminated	0.0002	5	0.00004	No

	water				
Triclopyr (TEA)	Larger mammal, contaminated water	0.0000004	5	0.00000009	No
Triclopyr (TCP)	Larger mammal, contaminated water	0.00001	12	0.0000009	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on Pacific marten could occur if they were to consume contaminated prey items or drink contaminated water. The risk assessment for Project herbicides does not exceed the level of concern for the contaminated water exposure scenarios for larger mammals (data were not available for small mammal or fish prey).

Direct effects on Pacific marten could occur if hazard trees that provide natal dens were removed. Pacific martens typically den in late-successional conifer forest with moderate-to-high canopy closure; these habitat characteristics are not typically associated with transmission right-of-ways, along roads and trails, or near hydroelectric facilities, where hazard tree abatement will typically occur. Therefore, hazard tree removal will not likely affect Pacific marten during denning, which is the most sensitive time where martens are relatively inactive and could be adversely affected. Any marten potentially using hazard trees as resting sites would be able to leave the area unharmed during tree removal activities. The Project Area has resting structures that would be suitable for resting martens that may be displaced by the Project. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for Pacific marten.

5 DETERMINATION OF EFFECTS

The VIWMP is not likely to result in a trend toward federal listing or loss of viability for Forest Service sensitive species identified for the Project. Effects determinations for each species are below.

5.1 Federally Listed Species

There will be no effect on the following federally listed species as a result of the Project:

- Valley elderberry longhorn beetle
- Sierra Nevada yellow-legged frog and designated Critical Habitat

5.2 Forest Service Sensitive Species

There will be no effect on the following Forest Service Sensitive species as a result of the Project:

- Sierra Nevada yellow-legged frog
- willow flycatcher

- Sierra Nevada red fox

The Project may affect individuals, but is not likely to result in a trend toward federal listing for the following Forest Service Sensitive species:

- western bumble bee
- hardhead
- foothill yellow-legged frog
- western pond turtle
- bald eagle
- northern goshawk
- California spotted owl
- Townsend's big-eared bat
- pallid bat
- fringed myotis
- Pacific marten

This document meets the requirements of FSM 2670, Preparation of Biological Evaluations for Threatened, Endangered and Sensitive Species; further biological evaluation is not required.

PREPARED BY: Holly Burger, Wildlife Biologist, Stillwater Sciences
DATE: 9 October 2017

REVIEWED BY: ____
DATE: ______________

6 LITERATURE CITED

AmphibiaWeb: Information on amphibian biology and conservation [web application]. 2017. Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/. (Accessed: February 2017).

Ashton, D.T., A.J. Lind, and K. E. Schlick. 1998. Foothill yellow-legged frog (*Rana boylii*) natural history. USFS, Pacific Southwest Research Station, Arcata, California.

Baldwin, B.G., D.H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Barr, C.B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service, Sacramento, California.

Barbour, R.W., and W.H. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.

Caltrans (California Department of Transportation). 2003. Storm Water Quality Handbooks. Construction Site Best Management Practices (BMPs) Manual.

CDFG (California Department of Fish and Game). 2009. Bald eagles in California. Nongame Wildlife Program, California Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/bald_eagle/ [Accessed June 2015].

CDFW (California Department of Fish and Wildlife). 2013. Evaluation of the petition to list the Townsend's big-eared bat (*Cornynorhinus townsendii*) as threatened or endangered. Prepared by CDFW, Sacramento, California.

CDFW. 2015. Bald eagles in California. Website. http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/bald_eagle/ [Accessed 12 June 2015]. Prepared by CDFW, Sacramento, California.

CDFW. 2017. California Natural Diversity Database. California Natural Diversity Database. RareFind3. Electronic database. Natural Heritage Division, California Department of Fish and Game, Sacramento, California. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data [Accessed February 2017].

Call, M.W. 1978. Nesting habits and survey techniques for common western raptors. Technical Note No. 316. U.S. Bureau of Land Management, Portland, Oregon.

Craig, D. and P.L. Williams. 1998. Willow Flycatcher (*Empidonax traillii*). *In* The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/plans.html.

DTA (Devine Tarbell & Associates, Inc.) 2004a. Valley elderberry longhorn beetle technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004b. Northern goshawk technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004c. California spotted owl technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004d. Willow Flycatcher nesting habitat technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004e. Bats technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004f. Mesocarnivores technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA and Santa Cruz Predatory Bird Research Group. 2004. Bald eagle and osprey technical report. Prepared by DTA, Sacramento, California and Santa Cruz Predatory Bird Research Group, Santa Cruz, California for Sacramento Municipal Utility District, Sacramento, California.

DTA and Stillwater Sciences. 2005a. Reservoir fisheries technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

DTA and Stillwater Sciences. 2005b. Stream fisheries technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

DTA and Stillwater Sciences. 2005c. Amphibians and aquatic reptiles technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

Duellman, W.E., and L. Trueb. 1986. Biology of Amphibians. McGraw-Hill Book Co., New York.

FERC (Federal Energy Regulatory Commission). 2014. Order Issuing New License for the continued operation of the Upper American River Project, FERC Project No. 2101, Washington, D.C.

Gutiérrez, R.J., A.B. Franklin, and W. S. Lahaye. 1995. Spotted owl (*Strix occidentalis*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/179/articles/introduction [Accessed September 2010].

Haley, D. 1975. Sleek and savage: North America's weasel family. Pacific Search Books, Seattle, WA. 128pp.

Hatfield, R.G. and G. LeBuhn. 2007. Patch and landscape factors shape community assemblage of bumble bees, *Bombus* spp. (Hymenoptera: Apidae) in montane meadows. Biological
Conservation 139:150–158.

Hermanson, J.W., and T.J. O'Shea. 1983. *Antrozous pallidus*. Mammalian Species 213: 1–8.

Herren, V., and B. Luce. 1997. Black Hills Bat Project: final report for 1997. Prepared by South Dakota Department of Game, Fish and Parks, Pierre, South Dakota.

Holland, D.C. 1994. The western pond turtle: habitat and history. Final Report. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report. Prepared for California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California.

Keane, J. 2008. Northern goshawk (*Accipter gentilis*). Pages 156–162 *in* W. D. Shuford and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of western birds no. 1. Western Field Ornithologists, Camarilla, California and California Department of Fish and Game, Sacramento, California.

Keinath, D. A. 2003. Species assessment for fringed myotis (*Myotis thysanodes*) in Wyoming. Prepared by University of Wyoming, Laramie for U.S. Bureau of Land Management, Wyoming State Office, Cheyenne.

Kucera, T.E., W.J. Zielinski, and R.H. Barrett. 1995. Current Distribution of the American marten, *Martes americana*, in California. Calif. Fish and Game 81 (3):96-103 1995.

Kupferberg, S.J. 1996. Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (*Rana boylii*). Ecological Applications 6: 1,332–1,344.

Lacki, M.J. and M. D. Baker. 2007. Day roosts of female fringed myotis (*Myotis thysanodes*) in xeric forests of the Pacific Northwest. Journal of Mammalogy 88: 967–973.

Lewis, S.E. 1994. Night roosting ecology of pallid bats (*Antrozous pallidus*) in Oregon. American Midland Naturalist 132: 219–226.

Martin, S.K. 1987. The ecology of the pine marten (*Martes americana*) at Sagehen Creek, California. Ph.D. Dissertation, University of California, Berkeley.

Matthews, K.R. and K.L. Pope. 1999. A telemetric study of the movement patterns and habitat use of *Rana muscosa*, the mountain yellow-legged frog, in a high-elevation basin in Kings Canyon National Park, California. Journal of Herpetology. 33:615-623.

NatureServe Explorer. 2015. Fringed myotis. Online: http://explorer.natureserve.org/servlet/NatureServe?searchName=Myotis+thysanodes

Perrine, J.D. 2005. Ecology of red fox (*Vulpes vulpes*) in the Lassen Peak Region of California, USA. Dissertation, University of California, Berkeley, California, USA.

Pesticide Research Institute. 2010. Marin Municipal Water District Herbicide Risk Assessment Draft Final January 1, 2010.

Philpott, W. 1997. Summaries of the life histories of California bat species. White paper. Pineridge Ranger District, Sierra National Forest. Prather, California.

Pierson, E.D. and G. M. Fellers. 1998. Distribution and ecology of the big-eared bat, *Corynorhinus townsendii* in California. Prepared for U.S. Geological Service, Species at Risk Program.

Pierson, E.D. and W. E. Rainey. 1996. The distribution, status and management of Townsend's big-eared bat (*Corynorhinus townsendii*) in California. Bird and Mammal Conservation Program Report 96-7. Prepared for California Department of Fish and Game.

Pierson, E.D. and W. E. Rainey. 2007. Bat Distribution in the forested region of northwestern California. Prepared for California Department of Fish and Game, Sacramento, California.

Pierson, E.D., W. E. Rainey, and R. M. Miller. 1996. Night roost sampling: a window on the forest bat community in northern California. Pages 151–163 *in* R. M. R. Barclay and R. M. Brigham, editors. Bats and Forests Symposium, 19–21 October 1995. Victoria, British Columbia, Canada. Working Paper 23/1996. Research Branch, B.C. Ministry of Forests, Victoria, British Columbia.

Pierson, E.D., W. E. Rainey, and C. Corben. 2001. Seasonal patterns of bat distribution along an altitudinal gradient in the Sierra Nevada. Prepared for California Department of Transportation, California State University at Sacramento Foundation, Yosemite Association, and Yosemite Fund.

Sedgwick, J.A. 2000. Willow flycatcher (*Empidonax traillii*). In A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/533/articles/introduction.

SERA (Syracuse Environmental Research Associates, Inc.). 2007. Aminopyralid - Human Health and Ecological Risk Assessment Worksheets. TR-052-04-04a.

SERA. 2014. Preparation of Environmental Documentation and Risk Assessments for the USDA/Forest Service. November 17, 2014.

Sherwin, R., and D.A. Rambaldini. 2005. *Antrozous pallidus* pallid bat. Species account developed for the Western Bat Working Group 1998 Reno Biennial Meeting; updated for the 2005 Portland Biennial Meeting.

Sherwin, R., and A. Piaggio. 2005. *Corynorhinus townsendii* Townsend's big-eared bat. Species account developed for the Western Bat Working Group 1998 Reno Biennial Meeting; updated for the 2005 Portland Biennial Meeting. Western Bat Working Group, Rapid City, South Dakota. http://wbwg.org/species_accounts/vespertilonidae/coto.pdf [Accessed July 2010].

Sherwin, R.E., D. Stricklan and D. S. Rogers. 2000. Roosting affinities of Townsend's big-eared bat (*Corynorhinus townsendii*) in northern Utah. Journal of Mammalogy 81: 939–947.

SMUD (Sacramento Municipal Utility District). 2004. Upper American River Project–Mesocarnivore technical report. Prepared by Devine Tarbell and Associates, Inc. FERC Project No. 2101.

SMUD. 2008. Upper American River Project (FERC No. 2101), Mitigation Monitoring Program including Construction and Operation of the Iowa Hill Pumped-Storage Development. April.

SMUD. 2016. Bald Eagle Monitoring Report. Prepared by Stillwater Sciences. FERC Project No. 2101. November 2016.

SMUD. 2017. Amphibian and Aquatic Reptile Monitoring Report. Prepared by Stillwater Sciences. FERC Project No. 2101. June 2017.

Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. Journal of Wildlife Management 47(4):1181-1186.

Spencer, W.D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. Journal of Wildlife Management 51(3):616-621.

Squires, J.R. and R. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). *In* A Poole, editor. The birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/298.

Stone, K. 2010. *Martes americana*, American marten. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/animals/mammal/maam/-all.html [2017, March 17].

SWRCB (State Water Resources Control Board). 2013a. Water Quality Certification for the Upper American River Project. Prepared by the State Water Resources Control Board.

SWRCB. 2013b. Water Quality Certification for the Upper American River Project, Attachment A – California Environmental Quality Act Findings and Mitigation Monitoring and Reporting Plan. Prepared by the State Water Resources Control Board.

Stebbins, R.C. 2003. A field guide to western reptiles and amphibians. Third edition. Houghton Mifflin Company, Boston-New York.

Stillwater Sciences. 2008. Technical Report on the 2007 Slab Creek Dam Reach Fish Distribution Study. Davis, CA. Unpublished Report.

Stillwater Sciences. 2015. Results of Sierra Nevada Yellow-legged Frog Pre-construction Surveys at Buck Island Weir Reconstruction and Rubicon Outlet Modification Project Sites.

Stillwater Sciences. 2017. Results of 2017 Supplemental Sierra Nevada Yellow-legged Frog Surveys at Select UARP Project Sites.

Williams, P.H., R.W. Thorp, L. L. Richardson, and S. R. Colla, S.R. 2014. The bumble bees of North America: an identification guide. Princeton University Press, Princeton.

USFS (United States Forest Service). 1989. Eldorado National Forest Regional Land and Resource Management Plan. USDA Forest Service, Pacific Southwest Region.

USFS. 2004. Sierra Nevada Forest Plan Amendment: Final Environmental Impact Statement Volumes 1-6 and Record of Decision. Pacific Southwest Region, San Francisco, CA. January 2001 and revised 2004.

USFS. 2012. Updated Activity Center and Protected Activity Center geospatial (shapefile) data for Northern Goshawk, and updated Activity Center, Protected Activity Center, and Home Range Core Area Data for California Spotted Owl.

USFS. 2014. USFS Species Fact Sheet for *Bombus occidentalis*, western bumble bee. Found at https://www.fs.fed.us/r6/sfpnw/issssp/documents3/sfs-iihy-bombus-occidentalis-2014-02.doc

USFWS (U. S. Fish and Wildlife Service). 1997. Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California. Letter from USFWS to USACE on November 13, 1997.

USFWS. 1998. Northern goshawk finding. Prepared by USFWS, Portland, Oregon.

USFWS. 1999. Conservation guidelines for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Sacramento, California.

USFWS. 2007. National bald eagle management guidelines.

USFWS. 2009. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project No. 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

USFWS. 2013. USFWS online database of USFWS and National Marine Fisheries Service (NMFS) Critical Habitat designations.

USFWS. 2014. Endangered and threatened wildlife and plants; endangered species status for Sierra Nevada yellow-legged frog and northern distinct population segment of the mountain yellow-legged frog, and threatened species status for Yosemite toad. Federal Register 79: 24,256–24,310.

USDI Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants: designation of critical habitat for the Sierra Nevada yellow-legged frog, the Northern DPS of the mountain yellow-legged frog, and the Yosemite toad; final rule. FR 81 (166): 59046-59119.

USFWS. 2017a. Information for Planning and Conservation (IPaC). https://ecos.fws.gov/ipac/ [Accessed January 19, 2017].

USFWS. 2017b. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

Vredenburg, V.T., G. Fellers, and C. Davidson. 2005. The mountain yellow-legged frog (*Rana muscosa*). In Lannoo, M.J. (Ed.), Status and Conservation of U.S. Amphibians. University of California Press, Berkeley, California, USA.

Vredenburg, V.T., R. Bingham, R.A. Knapp, J.A.T. Morgan, C. Moritz, and D. Wake. 2007. Concordant molecular and phenotypic data delineate new taxonomy and conservation priorities for the endangered Mountain Yellow-legged Frog. Journal of Zoology. Volume (271) 361–374.
WDFW (Washington State Department of Fish and Wildlife). 1994. Priority habitats management recommendations: caves. Unpublished Draft Report. Washington State Department of Fish and Wildlife, Olympia.

WDFW. 2004. Pallid bat (*Antrozous pallidus*). *In* Management recommendations for Washington's priority species, Volume V: mammals. Olympia, Washington.

Wengert, G. 2008. Habitat use, home range, and movements of mountain yellow-legged frogs (Rana muscosa) in Bean and Spanish Creeks on the Plumas National Forest. MGW Biological and Klamath Wildlife Resources, unpublished report.

Weller, T. J. and C. J. Zabel. 2001. Characteristics of fringed myotis day roosts in northern California. Journal of Wildlife Management 65: 489–497.

Western Bat Working Group. 2015. Western bat species. Website. http://wbwg.org/western-bat-species/ [Accessed 10 June 2015]. Prepared by Western Bat Working Group, Rapid City, South Dakota.

Woodbridge, B., and P.J. Detrich. 1994. Territory occupancy and habitat patch size of northern goshawks in the southern Cascades of California. Studies in Avian Biology 16: 83–87.

Zeiner, D.C., W.F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990a. California's wildlife. Volume II. Birds. California Statewide Habitat Relationships System. California Department of Fish and Game.

Zeiner, D.C., W.F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990b. California's wildlife. Volume III. Mammals. California Statewide Habitat Relationships System. California Department of Fish and Game.

Zielinski, W.J., R.H. Barrett, R.L. Truex, and E. Farmer. 1995. Southern Sierra Nevada fisher and marten study: Progress report III (2 March 1995–31 August 1995). USFS, Pacific Southwest Research Station, Arcata, California.

Zielinski, W.J., R.L. Truex, C.V. Ogan, and K. Busse. 1997. Detection surveys for fishers and American martens in California, 1989-1994: summary and interpretations. Pages 372–392 *in* G. Proulx, H. N. Bryant, and P., M. Woodard, editors. Martes: taxonomy, ecology, techniques, and management. Proceedings of the Second International Martes Symposium, Provincial Museum of Alberta, Edmonton.

Zweifel, R.G. 1955. Ecology, distribution, and systematics of frogs of the Rana boylei group. University of California Publications in Zoology 54: 207–292.

Appendix A

Animal Species Considered in the Biological Evaluation/Assessment for the Vegetation and Invasive Weed Management Plan

Table A-1. Wildlife Species[a] Considered in the Biological Evaluation/Assessment for the Vegetation and Invasive Weed Management Plan.

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Invertebrates					
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	DTA 2004a	FT/–	Streamside habitats throughout the Central Valley	Riparian and oak savanna habitats below 3,000 ft with host plant *Sambucus* sp. (blue elderberry)	None; does not occur in the Project Area since the ENF is located above 1,000 ft and the beetle is found at elevations generally below 500 ft (USFWS 2017)
Western bumble bee *Bombus occidentalis*	CNDDB, USFS list	FSS/–	Northern California	Uses flowering plants in meadows and forested openings; abandoned rodent burrows are used for nest and hibernation sites for queens	Moderate; suitable habitat present
Fish					
Pacific lamprey *Entosphenus tridentatus*	USFS list	FSS/SSC	From Los Angeles to Del Norte counties and the rivers in the Central Valley	Cold, clear water for spawning and incubation; adults use gravel areas to build nests, while ammocoetes need soft sediments in which to burrow during rearing	None; the Project Area is outside of the species' known range
Hardhead *Mylopharadon conocephalus*	USFS list	FSS/SSC	Low- to mid-elevation streams in the Sacramento and San Joaquin river drainages	Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity	High; documented in South Fork American River and Slab Creek Reservoir (DTA and Stillwater Sciences 2005a, 2005b; Stillwater Sciences 2008)
Cui-ui *Chasmistes cujus*	USFWS	FE/–	Pyramid Lake and the lower Truckee River, all within the Pyramid Lake Paiute Reservation in Nevada	Generally found in near shore areas at depths less than 75 feet	None; the Project Area is outside of the species' known range

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Delta smelt *Hypomesus transpacificus*	USFWS	FT/SE	Found only in the Sacramento-San Joaquin Estuary, including the lower reaches of Sacramento and Napa rivers; the Delta including Suisun Bay, Goodyear, Suisun, Cutoff, First Mallard, and Montezuma sloughs	Estuarine or brackish waters up to 18 parts per thousand (ppt); spawn in shallow brackish water upstream of the mixing zone (zone of saltwater-freshwater interface) where salinity is around 2 ppt	None; the Project Area is outside of the species' known range
Steelhead, central California coast DPS *Oncorhynchus mykiss*	USFWS	FT/–	Coastal California streams from the Russian River, south to Aptos Creek, San Francisco, San Pablo, and Suisun bays; the drainages of San Francisco, San Pablo, and Suisun bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin rivers; excludes the Sacramento-San Joaquin Delta	Rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; typically rear in fresh water for one or more years before migrating to the ocean	None; the Project Area is outside of the species' known range
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*	CNDDB, USFWS	FT/–	Great Basin watersheds in eastern California; primarily in the Carson, Walker, Truckee, and Susan River drainages	Cold water habitats including large lakes, alpine lakes, slow meandering rivers, mountain rivers, and small tributary streams	None; the Project Area is outside of the species' known range
Amphibians					
Yosemite toad *Anaxyrus canorus*	USFWS, USFS list	FT, FSS/SSC	Found only at high elevations in the Sierra Nevada Mountains, above 4,800 ft	Breeding habitat occurs in lakes, ponds and wetlands	None; no individuals documented during relicensing surveys (DTA and Stillwater Sciences 2005c)
California red-legged frog *Rana draytonii*	CNDDB, USFWS	FT/SSC	Largely restricted to coastal drainages on the central coast from Mendocino County to Baja California; in the Sierra	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-	None; no individuals or habitat documented during relicensing surveys (DTA and

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
			foothills south to Tulare and possibly Kern counties	gradient, slow moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	Stillwater Sciences 2005c)
Sierra Nevada yellow-legged frog *Rana sierrae*	CNDDB, USFWS, USFS list	FE, FSS/ST	From Plumas County, south through the Sierra Nevada, to Inyo County	Lakes, ponds, and streams in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats	Very unlikely; no individuals documented during relicensing surveys (DTA and Stillwater Sciences 2005c)
Foothill yellow-legged frog *Rana boylii*	CNDDB, USFS list	FSS/SSC	From the Oregon border along the coast to the Transverse Ranges, and south along the western side of the Sierra Nevada Mountains to Kern County; a possible isolated population in Baja California	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate	High; documented in the UARP area during relicensing surveys (DTA and Stillwater Sciences 2005c)
Reptiles					
Western pond turtle *Actinemys marmorata*	CNDDB, USFS list	FSS/SSC	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	High; documented in the UARP area during relicensing surveys (DTA and Stillwater Sciences 2005c)
Birds					
Bald eagle *Haliaeetus leucocephalus*	CNDDB, USFS list	FD, BGEPA, FSS/SE, SFP	Permanent resident and uncommon winter migrant, found nesting primarily in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests and winter communal roosts in advanced-successional conifer forest within 1.6 km (1 mi) of open water	High; confirmed bald eagle nesting territories at Union Valley and Loon Lake Reservoirs (DTA and Santa Cruz Predatory Bird Research Group 2004a)

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Northern goshawk *Accipter gentilis*	CNDDB, USFS list	FSS/SSC	Nests in North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner Mountains, in Mount Pinos and San Jacinto, San Bernardino, and White Mountains; winters along north coast, throughout foothills, and in northern deserts	Mature and old-growth stands of coniferous forest, middle and higher elevations; nests in dense part of stands near an opening	High; known to nest in the UARP area (DTA 2004e, f)
California spotted owl *Strix occidentalis*	USFS list	FSS/SSC	From the southern Cascade Range of northern California, south along the west slope of the Sierra Nevada, and in mountains of central and southern California nearly to the Mexican border	Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging	High; known to nest in the vicinity of the UARP area (DTA 2004b)
Great gray owl *Strix nebulosa*	USFS list	FSS/SE	In the Sierra Nevada from the vicinity of Quincy, Plumas County south to around Yosemite	Dense, coniferous forest, usually near a meadow for foraging; nests in large, broken-topped snags	None; no suitable habitat in the Project Area
Willow flycatcher *Empidonax traillii*	CNDDB, USFS list	FSS/SE	In the Sierra Nevada and Cascade ranges; nests as far south as San Diego County; confirmed breeding along the Eel River, and in mesic clear-cuts in northern Humboldt County	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clearcuts) in the Pacific Northwest	Very unlikely; no willow flycatchers detected during relicensing surveys (DTA 2004d); only marginally suitable habitat within Project Area
Mammals					
Townsend's western big-eared bat *Corynorhinus townsendii*	CNDDB, USFS list	FSS/SSC	Throughout California, found in all but subalpine and alpine habitats, details of distribution not well known	Most abundant in mesic habitats; also found in oak woodlands, desert, vegetated drainages, caves or cave-like structures (including basal hollows in large trees, mines, tunnels, and buildings)	Moderate; may roost and forage in Project Area

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Pallid bat *Antrozous pallidus*	CNDDB, USFS list	FSS/SSC	Throughout California except for elevations greater than 10,000 ft in the Sierra Nevada	Roosts in rock crevices, tree hollows, mines, caves, and a variety of vacant and occupied buildings; feeds in a variety of open terrestrial habitats	Moderate; may roost and forage in Project Area
Fringed myotis *Myotis thysanodes*	CNDDB, USFS list	FSS/–	Widespread in California, occurring in all but the Central Valley and Colorado and Mojave Desert	Roosts in crevices in rocks, cliffs, buildings, underground mines, caves, bridges, and in large, decadent trees; most maternal roost sites documented in California have been found in buildings	High; captured in Project Area (DTA 2004c)
Sierra Nevada red fox *Vulpes vulpes necator*	CNDDB	FSS/ST	Cascade Range east to the Sierra Nevada and south to Tulare County; majority of sightings in vicinity of Lassen and Yosemite National Parks	High-elevation (from 5,000 ft to 7,000 ft); conifer forest, sub-alpine woodlands, and barren areas above treeline	Low; limited potential habitat near Project Area (DTA 2004d)
California wolverine *Gulo gulo*	CNDDB, USFS list	FPT, FSS/ST, SFP	Scarce resident of North Coast mountains and Sierra Nevada	Dense mixed-conifer forest in high elevations (between 4,300 ft and 10,800 ft); uses caves, hollows, logs, rock outcrops, and burrows for cover	None; only one confirmed wolverine sighting in California; persistence of this species in the Sierra Nevada is debated (DTA 2004d)
Pacific marten *Martes caurina*	CNDDB, USFS list	FSS/–	Sierra Nevada, Klamath, Cascade mountains, and California north coast regions	High elevation (above 5,500 ft); mature mixed evergreen forests with 40% crown closure, large trees, and snags	High; suitable habitat throughout Project Area, and documented in the Eldorado National Forest (CDFW 2017)
Pacific fisher *Pekania pennanti* West Coast DPS	CNDDB, USFS list	FPT, FSS/SCT, SSC	Two widely separated regions: the northern Coast Range and Klamath Province, and the southern Sierra Nevada	Advanced successional conifer forests, with complex forest structure being more important than tree species; den in hollow trees and snags	None; species considered extirpated/absent or extremely rare from the Central Sierra Nevada

[a] Wildlife species listed in taxonomic order

[b] Status codes:

Federal		State
FE	= Listed as endangered under the federal Endangered Species Act	SE = Listed as Endangered under the California Endangered Species Act
FT	= Listed as threatened under the federal Endangered Species Act	ST = Listed as Threatened under the California Endangered Species Act
FPT	= Federally proposed as threatened	SCT = State Candidate Threatened
FD	= Federally delisted	SSC = State Species of Special Concern
FSS	= Forest Service Sensitive species	SFP = State Fully Protected species
BGEPA	= Federally protected under the Bald and Golden Eagle Protection Act	

Appendix G
Biological Evaluation For Botanical Resources

BIOLOGICAL EVALUATION FOR BOTANICAL RESOURCES
SMUD VEGETATION AND INVASIVE WEED MANAGEMENT PLAN FOR THE UPPER AMERICAN RIVER PROJECT (UARP) FERC 2101, ELDORADO NATIONAL FOREST

PROJECT LOCATION:
El Dorado County, California
T11N R11E 24-26
T11N R12E Sections 1, 10-16, 19–22, 28 & 29
T11N R13E Sections 1-8
T11N R14E Sections 1, 2, 6, 7, 12, 18
T11N R15E Sections 5–8
T12N R13E Sections 32–36
T12N R14E Sections 2–4, 8–11, 14–33, 35, 36
T13N R14E Sections 13–15, 22, 23, 26, 27, 34, 35
T13N R15E Sections 2–5, 7–9, 17, 18
T13N R16E Sections 6–9, 16, 17
T14N R15E Sections 33, 34
Mount Diablo Baseline and Meridian (MDB&M).

Prepared By: Nicole Jurjavcic_________ Title: Senior Botanist_____ Date: February 23, 2017

Reviewed By: Matt Brown Title: Botanist, Eldorado National Forest Date: Sept. and Dec., 2017

Approved By: ______________________Title______________________ Date: ___________

SMUD Contact: *Ethan Koenigs* Phone Number: *530-647-5094* Email: *ethan.koenigs@smud.org*

Summary

SMUD’s Vegetation and Invasive Weed Management Plan for the Upper American River Project (UARP) (SMUD 2017) is not likely to result in a trend towards federal listing or loss of viability of any of the special-status plant species documented within the Project Area (Table 1).

Table 1. Eldorado National Forest Sensitive species and determination of potential effect by implementation of the VIWMP.

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Vascular			
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium montanum	western goblin	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium pendunculosum	stalked moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	Outside of the Project Area elevation range therefore would not be affected
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	Outside of the Project Area elevation range therefore would not be affected
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	Outside of the Project Area elevation range therefore would not be affected
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Packera layneae	Layne's ragwort	FT/CR/FSS/1B.2	No effect
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Pinus albicaulis	white bark pine	–/–/FSS/–	No effect
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Bryophytes			
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Fungi			
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lichens			
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

[1] Status:
Federal
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare

– No state status

USFS

FSS USFS Sensitive

California Rare Plant Rank (formerly known as CNPS Lists)

1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:

0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

1 INTRODUCTION

1.1 Purpose

The purpose of this botanical Biological Evaluation (BE) is to evaluate potential effects (direct and indirect) to special-status plants, rare natural communities and invasive weeds within Project Area as a result of implementing the VIWMP.

1.2 Project Area

The Project Area addressed by this BE is defined as the UARP FERC boundary limited to USFS lands (Figure 1).

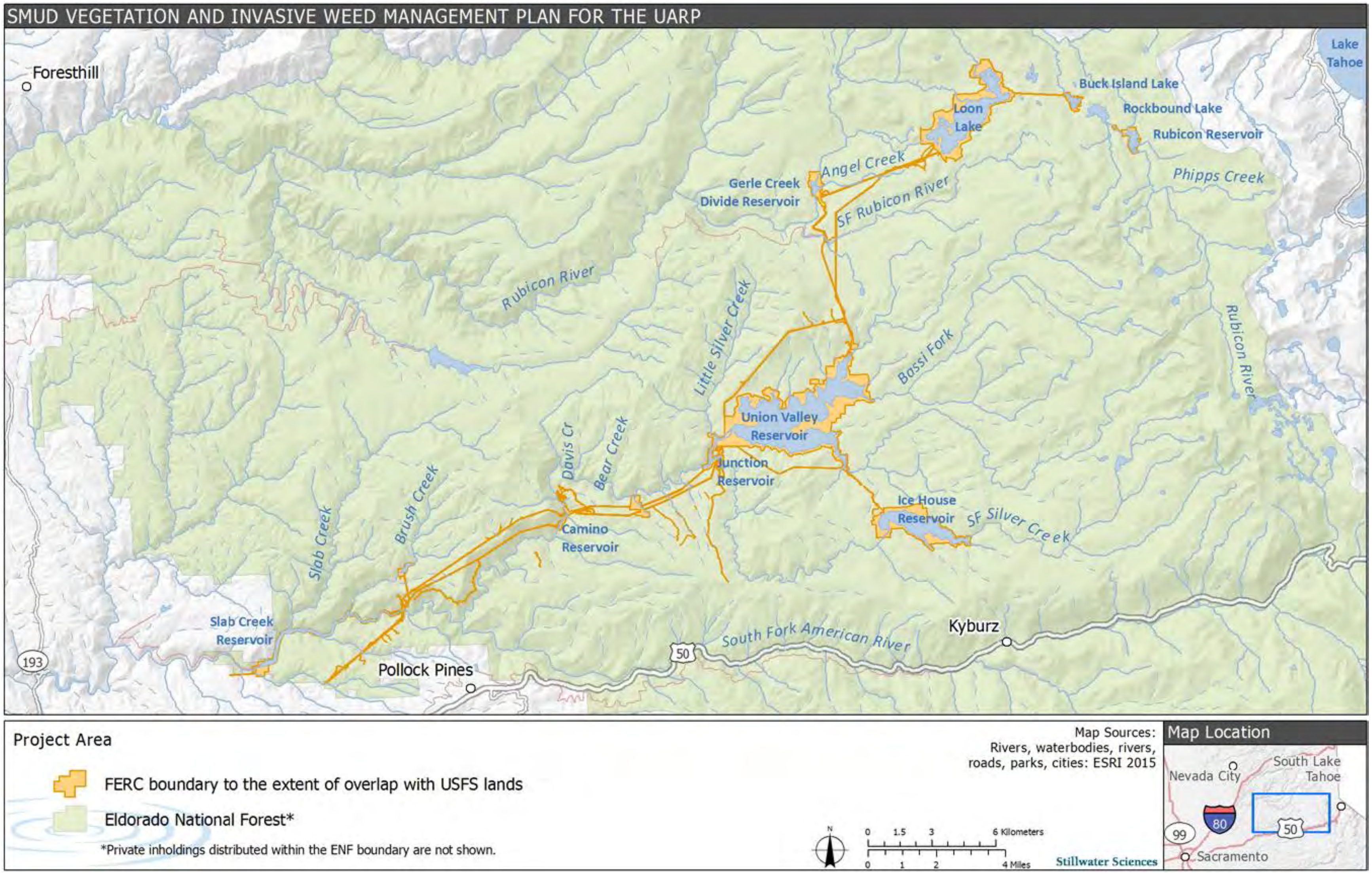


Figure 1. Project Area for the Botanical Biological Evaluation for SMUD's Vegetation and Invasive Weed Management Plan for the UARP.

2 CONSULTATION TO DATE

The Biological Opinion (BO) on the Issuance of a New License for the Upper American River Hydroelectric Project (USFWS 2009) addressed the effects of the proposed action on the endangered *Ceanothus roderickii* (Pine Hill ceanothus), *Fremontodendron decumbens* (Pine Hill flannelbush), and the threatened *Packera layneae (*Layne's butterweed). SMUD will adopt conservation measures related to these species including consultation with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve, restriction of treatment to manual methods only (no chemical use) when managing vegetation in the transmission ROW within the preserve, and marking of species' occurrences at the site prior to the onset of activities.

Ceanothus roderickii, *Fremontodendron decumbens*, and *Packera layneae* are located primarily on gabbro-derived soils and are not within the Project Area of this BE; no Threatened, Endangered, or Proposed (TEP) species are known to occur within the Project Area and there is no habitat within the Project Area for these species or *Pinus albicaulis* (whitebark pine; federal candidate). Considering this, no additional formal or informal consultation with the USFWS is necessary.

3 CURRENT MANAGEMENT DIRECTION

The goal of the Forest Sensitive Plant Program is to maintain viable populations of sensitive plant species, and, under Standards and Guidelines for Management Practice 49, "provide for protection and habitat needs of sensitive plants so that Forest activities will not jeopardize the continued existence of such species" (USFS 1989).

Current policy as stated in the USFS Manual (FSM 2670.32) states the following:

1. Assist states in achieving their goals for conservation of endemic species.
2. Review programs and activities as part of the National Environmental Policy Act of 1969 process through a biological evaluation, to determine their potential effect on sensitive species.
3. Avoid or minimize impacts to species whose viability has been identified as a concern.
4. Analyze, if impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward federal listing.)
5. Establish management objectives in cooperation with the states when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for federal candidate species, in cooperation with the FWS or NOAA Fisheries and the states.

USFS Manual (FSM) 2900, Invasive Species Management, sets forth National Forest System (NFS) policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens).

The Sierra Nevada Forest Plan Amendment (USFS 2004) provides standards and guidelines for managing noxious weeds. These include but are not limited to:

1. As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
2. When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both USFS and contracted) used for project implementation to be weed free.
3. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds.
4. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
5. As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.

4 EXISTING ENVIRONMENT

4.1 Vegetation Types

The Project Area occurs within the Northern High Sierra Nevada Subregion of the California Floristic Province (Baldwin et al. 2012). SMUD facilities within the Project Area including roads, transmission lines, and structures (i.e., powerhouses, penstocks, recreational areas, etc.) are distributed among the varying habitats and topography; elevations range from approximately 1,800–6,500 feet (ft). Vegetation mapping information was obtained from the CALVEG datasets available through the California Land Cover Mapping and Monitoring Program (USFS 2016). Vegetation community types discussed in this section are based on the California Wildlife Habitat Relationships (CWHR) habitat classification scheme (Mayer and Laudenslayer 1988).

Vegetation with in the Project Area is dominated by Sierran Mixed Conifer (Table 2). Habitats that may support rare natural communities[1] (e.g., fens, lava caps) are interspersed. Three rare natural communities, lava caps, fens and sphagnum bogs, have been documented within the Project Area (Appendix A).

[1] Rare natural communities are defined as those natural community types with a ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) by CDFW or of management concern for the Eldorado National Forest.

Table 2. Vegetation Types and Acreage in the Project Area.

California Wildlife Habitat Relationships Type	Ac
Annual Grassland (AGS)	67
Blue Oak Woodland (BOW)	5
Closed-Cone Pine-Cypress (CPC)	2
Jeffrey Pine (JPN)	39
Mixed Chaparral (MCH)	34
Montane Chaparral (MCP)	498
Montane Hardwood-Conifer (MHC)	59
Montane Hardwood (MHW)	256
Montane Riparian (MRI)	3
Perennial Grassland (PGS)	121
Ponderosa Pine (PPN)	119
Red Fir (RFR)	34
Sierran Mixed Conifer (SMC)	2,449
White Fir (WFR)	131
Wet Meadow (WTM)	77

4.2 Special-Status Plants

Appendix B includes a list of special-status plant species[2] that could occur in the Project Area based on habitat conditions (soils, habitat type, elevation, and distributional range). The list was developed by querying the following resources:

- The U.S. Fish and Wildlife Service (USFWS) list of federally listed and proposed endangered and threatened species (USFWS 2017),
- The California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2017),
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2017b), and
- Eldorado National Forest's (ENF's) Sensitive and Watch plant lists (ENF 2016, 2017a).

The USFWS, CNPS, and CNDDB database queries were each based on a search of the Project Vicinity which is defined as the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring). Appendices A and B list all rare natural communities and special-status plant species identified from the USFWS, CNPS, and

[2] Special-status species are defined as those listed, proposed, or under review as rare, threatened, or endangered by the federal or California state government, on the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2016a) with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4, and/or on ENF's Sensitive or Watch plant lists.

CNDDB database queries. Appendices C and D identify the current ENF Sensitive and Watch lists (ENF 2016, 2017a), respectively.

Information on known occurrences of special-status plant species and rare natural communities documented in the Project Area was compiled and plotted on a Geographic Information System (GIS) map; this included CNDDB spatial data for the Project, results of a comprehensive floristic surveys for special-status and target invasive plants conducted within the UARP boundary in 2000 and 2003 (DTA 2004) and 2016 (Atkins 2016) as well as the Eldorado National Forest 2017 botany geodatabase (2017b). Table 3 summarizes the Federally listed, ENF Sensitive and Watchlist plant species documented in the Project Vicinity; 64 of the 73 species have the potential to occur within the Project Area and a total of five ENF Sensitive plant species and thirteen ENF Watchlist plant species have been documented in the Project Area. No TEP plant taxa were documented within the Project Area. Section 4.2.1 provides location information for the ENF sensitive plant species documented in the Project Area and Section 4.2.2 provides location information for the ENF Watch List plant species documented in the Project Area.

Table 3. Federally listed, ENF Sensitive and Watch List species documented in the Project Vicinity[1]. Taxa that do not have potential habitat in the project area are not further analyzed in this document.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Federally Listed Species							
Packera layneae	Layne's ragwort	FT/CR/FSS/1 B.2	April–August	200–1,085	perennial herb	Serpentinite or gabbroic rocky soils in chaparral and cismontane woodland	No; serpentinite or gabbroic soils are not found in the project area
ENF Sensitive Species							
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	April–August	1,100–3,000	perennial bulbiferous herb	Volcanic, chaparral, lower montane coniferous forest, Upper montane coniferous forest	Yes; potential habitat in the Project Area
Arcto*staphylos nissenana*	Nissenan manzanita	–/–/FSS/1B.2	February–March	450–1,100	perennial evergreen shrub	Rocky soils in closed-cone coniferous forest and chaparral	Yes; potential habitat in the Project Area
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	March–June	90–1,555	perennial herb	Sometimes serpentinite, chaparral, cismontane woodland, valley and foothill grassland	Yes; potential habitat in the Project Area
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	July–August	1,115–2,700	perennial rhizomatous herb	Mesic soils in lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	June–September	1,268–3,280	perennial rhizomatous herb	Bogs and fens, lower montane coniferous forest, meadows and seeps, freshwater marshes and swamps, and upper montane coniferous forest	Yes; documented in the Project Area (CDFW 2017b)
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	August	1,980–3,400	perennial rhizomatous herb	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	July–September	1,455–2,180	perennial rhizomatous herb	Mesic soils in bogs and fens, lower montane coniferous forest, edges of meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium montanum	western goblin	–/–/FSS/2B.1	July–September	1,465–2,180	perennial rhizomatous herb	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	August	1,740–4,200	perennial rhizomatous herb	Limestone and marble alpine boulder and rock fields and moist areas of upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium pendunculosum	Stalked moonwort	–/–/FSS/2B.1	July-September	1,740–4,200	perennial rhizomatous herb	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May–July	305–1,800	perennial bulbiferous herb	Josephine silt loam and volcanic soils in lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	March – August	185–2,225	perennial rhizomatous herb	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, and north coast coniferous forest	Yes; potential habitat in the Project Area
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	July–August (September)	2,500–3,505	perennial herb	Alpine boulder and rock field, subalpine coniferous forest	No; outside of the Project Area elevation range
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	July–August (September)	2,500–2,815	perennial herb	Rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May–July	200–1,600	perennial deciduous shrub	Often serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	April–September	80–1,070	perennial herb	Ione formation and other soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	(April), May–August	765–2,365	perennial herb	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	(April), May–August	1,465–2,365	perennial herb	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	July–August (September)	2,500–2,925	perennial herb	Granitic soils in alpine boulder and rock field and mesic rocky areas of subalpine coniferous forest	No; outside of the Project Area elevation range
Lewisia serrata	saw-toothed	–/–/FSS/1B.1	May–June	770–1,435	perennial	Mesic, rocky slopes in broadleaved	Yes; documented

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
	lewisia				herb	upland forest, lower montane coniferous forest, and riparian forest	in the Project Area (CDFW 2017b)
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	April – July	600–2,000	annual herb	Vernally mesic, often disturbed areas, clay, lower montane coniferous forest, meadows and seeps.	Yes; potential habitat in the Project Area
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May–July	853–1,402	annual herb	Chaparral and cismontane woodland	Yes; documented in the Project Area (ENF 2017b)
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	July	1,000–2,000	perennial rhizomatous herb	Meadows and seeps and the margins of marshes and swamps	Yes; potential habitat in the Project Area
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May–July	610–2,010	annual herb	Cismontane woodland, lower montane coniferous forest, and meadows and seeps	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Pinus albicaulis	white bark pine	–/–/FSS/–	N/A	2,000–3,700	perennial evergreen tree	Upper red-fir forest to timberline, especially subalpine forest	No; outside of the Project Area elevation range
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	April–July	365–1,500	perennial rhizomatous herb	Openings in lower montane coniferous forest	Yes; potential habitat in the Project Area
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	Not applicable	1,700–2,800	moss	Damp soils in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	Not applicable	1,862–2,700	moss	Damp soil in meadows and seeps and subalpine coniferous forest	Yes; potential habitat in the Project Area
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	Not applicable	1,210–2,804	moss	Damp soil in bogs and fens, meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	Not applicable	0–1,960	moss	Metamorphic rock, usually acidic, usually vernally mesic, often roadsides, sometimes carbonate, broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest	Yes; potential habitat in the Project Area
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	fruits primarily in spring	160–1,827	fungi	Common under conifers in mature moist coniferous forests in northern CA and the Pacific Northwest. Typically associated with very rotten wood[4]	Yes; potential habitat in the Project Area
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	fruits September –December	6–962	fungi	Grows on ground in mixed woods and under conifers in southern Oregon and northern California[4]	Yes; potential habitat in the Project Area
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	Not applicable	1,065–2,620	foliose lichen (aquatic)	On rocks in cold water creeks with little or no sediment or disturbance in riparian forests	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
ENF Watchlist Species							
Allium sanbornii var. *congdonii*	Congdon's onion	–/–/FSW/4.3	April–July	300–990	perennial bulbiferous herb	Serpentine or volcanic soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Allium sanbornii var. *sanbornii*	Sanborn's onion	–/–/FSW/4.2	May–September	260–1,510	perennial bulbiferous herb	Usually serpentinite or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area
Astragalus austiniae	Austin's astragalus	–/–/FSW/1B.3	(May), July–September	2,440–2,970	perennial herb	Rocky soils in alpine boulder and rock field and subalpine coniferous forest	No; outside of the Project Area elevation range
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	–/–/FSW/4.3	July–August	2,135–3,050	perennial herb	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	Yes; potential habitat in the Project Area
Bolandra californica	Sierra bolandra	–/–/FSW/4.3	June–July	975–2,450	perennial herb	Mesic, rocky soils in lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium simplex	least moonwort	–/–/FSW/2B.3	May–September	1,500–3,200	perennial rhizomatous herb	In saturated moss or sedge mats around hard water seeps and streamlets	Yes; documented in the Project Area (ENF 2017b).
Calystegia vanzuukiae	Van Zuuk's morning-glory	–/–/FSW/1B.3	May–August	500–1,180	perennial rhizomatous herb	Gabbro, serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Carex cyrtostachya	Sierra arching sedge	–/–/FSW/1B.2	May–August	610–1,360	perennial herb	Mesic areas in lower montane coniferous forest, meadows and seeps, marshes and swamps, and the margins of riparian forests	Yes; potential habitat in the Project Area
Carex davyi	Davy's sedge	–/–/FSW/1B.3	May–August	1,500–3,200	perennial herb	Subalpine coniferous forest, upper montane coniferous forest	Yes documented in the Project Area (ENF 2017b)
Ceanothus fresnensis	Fresno ceanothus	–/–/FSW/4.3	May–July	900–2,103	perennial evergreen shrub	Openings in cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (ENF 2017b)

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Chaenactis douglasii var. *alpina*	alpine dusty maidens	–/–/FSW/2B.3	July–September	2,865–3,400	perennial herb	Granitic soils in alpine boulder and rock field	No; outside of the Project Area elevation range
Chlorogalum grandiflorum	Red Hills soaproot	–/–/FSW/1B.2	May–June	245–1,690	perennial bulbiferous herb	Serpentinite, gabbroic and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	–/–/FSW/4.2	May–July	75–915	annual herb	Often roadcuts in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Clarkia virgata	Sierra clarkia	–/–/FSW/4.3	May–August	400–1,615	annual herb	Cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Claytonia megarhiza	fell-fields claytonia	–/–/FSW/2B.3	July–September	2,600–3,532	perennial herb	In crevices between rocks in alpine boulder and rock field and rocky of gravelly soils of subalpine coniferous forest	No; outside of the Project Area elevation range
Corallorhiza trifida	northern coralroot	–/–/FSW/4.3	June–July	1,370–1,745	perennial rhizomatous herb (achlorophyllous)	Mesic soils, lower montane coniferous forest, edges of meadows and seeps	Yes; potential habitat in the Project Area
Drosera anglica	English sundew	–/–/FSW/1B.1	June – September	1,300–2,255	perennial herb (carnivorous)	Bogs and fens, meadows and seeps with mesic soil	Yes; potential habitat in the Project Area
Drosera rotundifolia	round-leaved sundew	–/–/FSW/–	June–September	0–2,700	perennial herb	Swamps, wet meadows, forests, peatlands, often with Sphagnum	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & ENF 2017b).

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Dryopteris filix-mas	male fern	–/–/FSW/2B.4	July – September	2,400–3,100	perennial rhizomatous herb	Upper montane coniferous forest in granitic, rocky soils	No; outside of the Project Area elevation range
Eriogonum ovalifolium var. *eximium*	brown-margined buckwheat	–/–/FSW/4.3	June–August	1,800–3,400	perennial herb	Granitic and sandy soils in alpine boulder and rock field, and subalpine coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	–/–/FSW/4.3	May–June	320–610	annual herb	Serpentinite or lone soils in cismontane woodland	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Glyceria grandis	American manna grass	–/–/FSW/2B.3	June–August	15–1,980	perennial rhizomatous herb	Bogs and fens, meadows and seeps, and marshes and swamps along streambanks and lake margins	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Jensia yosemitana	Yosemite tarweed	–/–/FSW3.2	May–June	12–2,300	Annual herb	Spring-wet, sunny, sandy places, meadows	Yes; documented in the Project area (ENF 2017b)
Mimulus laciniatus	cut-leaved monkeyflower	–/–/FSW/4.3	April – July	490–2,650	annual herb	Mesic, granitic soils in chaparral, lower montane coniferous forest, and upper montane coniferous forests.	Yes; potential habitat in the Project Area
Myrica hartwegii	Sierra sweet bay	–/–/FSW/4.3	May–June	150–1,750	perennial deciduous shrub	Cismontane woodland, lower montane coniferous forest, and riparian forest	Yes; potential habitat in the Project Area
Orthotrichum holzingeri	Holzinger's orthotrichum moss	–/–/FSW/1B.3	Not applicable	715–1,800	moss	Usually on rock in and along streams, rarely on tree limbs, in cismontane woodland, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Perideridia bacigalupii	Bacigalupi's yampah	–/–/FSW/4.2	June – August	450–1,035	perennial herb	Serpentine soils in chaparral and lower montane coniferous forest.	Yes; potential habitat in the Project Area
Rhynchospora alba	white beaked-rush	–/–/FSW/2B.2	June – August	60–2,040	perennial rhizomatous herb	Bogs and fens, meadows and seeps and freshwater marshes and swamps	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Sparganium natans	small bur-reed	–/–/FSW/4.3	June – September	1,625–2,500	perennial rhizomatous herb (emergent)	Bogs and fens, meadows and seeps, marshes and swamps, along lake margins	Yes; potential habitat in the Project Area
Piperia colemanii	Coleman's Rein Orchid	–/–/FSW/4.3	May–July	1,188-2,300	perennial	Open conifer forest, scrub; often in sandy soils.	Yes; potential habitat in the Project Area
Piperia leptopetala	narrow-petaled rein orchid	–/–/FSW/4.3	May–July	380–2,225	perennial herb	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area
Pseudostellaria sierra	Sierra starwort	–/–/FSW/4.2	May–August	1,225–2,194	perennial rhizomatous herb	Chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (ENF 2017b)
Rhynchospora capitellata	brownish beaked-rush	–/–/FSW/2B.2	July–August	45–2,000	perennial herb	Mesic soils in lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Sambucus nigra subsp. *caerulea*	blue elderberry	–/–/FSW/–	Mar–Sep	0–3,000	shrub	Streambanks, open places in forest.	Yes; potential habitat in the Project Area
Streptanthus longisiliquus	long-fruit jewelflower	–/–/FSW/4.3	April–September	715–1,500	perennial herb	Openings in cismontane woodland, lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Taxus brevifolia	Pacific yew	–/–/FSW/–	Not applicable	10–2,150	shrub, small tree	Dense, mixed-evergreen forests, lower slopes, and canyon bottoms	Yes; documented in the Project Area (DTA 2004 & ENF 2017b)
Torreya californica	California nutmeg	–/–/FSW/–	Not applicable	10–2,100	tree	Shady moist canyons in forest or woodland, occasionally chaparral	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Viburnum ellipticum	oval-leaved viburnum	–/–/FSW/2B.3	May–June	215–1,400	perennial deciduous	Chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
					shrub		Project Area
Wyethia reticulata	El Dorado County mule ears	–/–/FSW/1B.2	April – August	185–230	perennial herb	Clay or gabbroic soils in chaparral, cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)

1 Project Vicinity includes the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

2 Status:

Federal
FT Federally listed as threatened
– No federal status

State
CR California State listed as rare
– No state status

USFS
FSS USFS Sensitive
FSW USFS Watch List

California Rare Plant Rank (formerly known as CNPS Lists)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

3 All data from ENF (2016, 2017a), CNPS (2017), or Baldwin et al. (2012) unless otherwise noted.

4 Information sources include Arora, D. 1986. Mushrooms demystified a comprehensive guide to the fleshy fungi. Second edition. Ten Speed Press, Berkeley, California; and USDA Forest Service and BLM (Bureau of Land Management). 2017. Interagency Special Status/Sensitive Species Program (ISSSSP). Website. https://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-fungi.shtml [Accessed September 20, 2017].

4.2.1 *ENF Sensitive Species Documented in the Project Area*

4.2.1.1 *Botrychium crenulatum (scalloped moonwort)*

Botrychium crenulatum (scalloped moonwort) is a perennial rhizomatous herb in the Ophioglossaceae family. It is threatened by grazing, foot traffic, recreational activities, trampling, fuel reduction projects, road deconstruction, and vehicles, and is possibly threatened by logging and hydrological alterations (CNPS 2017). Within the Project Area one occurrence of *Botrychium crenulatum* was documented in CNDDB (CDFW 2017b) approximately 0.7 miles west of Schlein Ranger Station. There are 13 occurrences on a total of 0.3 acre on the ENF (ENF 2017b).

4.2.1.2 *Calochortus clavatus var. avius (Pleasant Valley mariposa lily)*

Calochortus clavatus var. *avius* (Pleasant Valley mariposa lily) is a perennial bulbiferous herb in the Liliaceae family. It is threatened by development and logging, and is possibly threatened by horticultural collection and pipeline construction (CNPS 2017). Within the Project Area eight occurrences of *Calochortus clavatus* var. *avius* were documented throughout the Project Area in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b). There are 146 occurrences on a total of 117.5 acres on the ENF (ENF 2017b).

4.2.1.3 *Lewisia serrata (saw-toothed lewisia)*

Lewisia serrata (saw-toothed lewisia) is a perennial herb in the Onagraceae family. *Lewisia serrata* is threatened by small hydroelectric power projects and horticultural collecting, and is potentially threatened by recreational activities and road maintenance (CNPS 2017). Within the Project Area two occurrences of *Lewisia serrata* were documented in CNDDB (CDFW 2017b) at Junction Reservoir and Camino Reservoir. There are five occurrences on a total of 1.4 acres on the ENF (ENF 2017b).

4.2.1.4 *Navarretia prolifera subsp. lutea (yellow bur navarretia)*

Navarretia prolifera subsp. *lutea* (yellow bur navarretia) is an annual herb in the Polemoniaceae family. It is threatened by logging and maintenance vehicles (CNPS 2017). Within the Project Area one occurrence of *Navarretia prolifera* subsp. *lutea* was documented in the ENF 2017 database (ENF 2017b) under transmission line right of way near Cable Road. There are 84 occurrences on a total of 300 acres on the ENF (ENF 2017b).

4.2.1.5 *Phacelia stebbinsii (Stebbins' phacelia)*

Phacelia stebbinsii (Stebbins' phacelia) Stebbins' phacelia is an annual herb in the Boraginaceae family. It is potentially threatened by logging, trail maintenance and nonnative plants (CNPS 2017). *Phacelia stebbinsii* is locally abundant; within the Project Area 30 occurrences of *Phacelia stebbinsii* were documented in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along access roads to Jaybird Powerhouse and Camino Reservoir, Junction Reservoir, and Union Valley Powerhouse. There are 52 occurrences on a total of 146.7 acres on the ENF (ENF 2017b).

4.2.2 ENF Watch List Species Documented in the Project Area

4.2.2.1 *Botrychium simplex (least moonwort)*

Botrychium simplex (least moonwort) is a perennial rhizomatous herb in the Ophioglossaceae family. Within the Project Area one occurrence was documented in the ENF 2017 database (2017b) at Angel Creek. There are 45 occurrences on a total of 1.1 acre on the ENF (ENF 2017b).

4.2.2.2 *Carex davyi (Davy's sedge)*

Carex davyi (Davy's sedge) is a perennial herb in Cyperaceae family. Within the Project Area three occurrences were documented at the Loon Lake campground, Gerle Creek Campground, and near the South Fork of the Rubicon River. There are five occurrences documented on a total of 0.19 acres on the ENF (ENF 2017b).

4.2.2.3 *Ceanothus fresnensis (Fresno ceanothus)*

Ceanothus fresnensis (Fresno ceanothus) is a perennial evergreen shrub in the Rhamnaceae family. Within the Project Area and on the ENF, one occurrence was documented on a total of 0.3 acre (ENF 2017b) at Chaix Mountain.

4.2.2.4 *Chlorogalum grandiflorum (Red Hills soaproot)*

Chlorogalum grandiflorum (Red Hills soaproot) is a perennial bulbiferous herb in the Agavaceae family. Red Hills soaproot is threatened by development, mining, road construction, and vehicles; it is possibly threatened by trail maintenance, logging, and non-native plants (CNPS 2017). *Chlorogalum grandiflorum* is locally abundant; within the Project Area thirty-seven occurrences of *Chlorogalum grandiflorum* were documented in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along the access roads to Brush Creek, Jaybird Powerhouse and Camino Reservoir, the powerline near Poho ridge and the Forebay north of the South Fork American River. There are 49 occurrences on a total of 562.5 acres on the ENF (ENF 2017b).

4.2.2.5 *Clarkia biloba subsp. brandegeeae (Brandegee's clarkia)*

Clarkia biloba subsp. *brandegeeae* (Brandegee's clarkia) is an annual herb in the Onagraceae family. *Clarkia biloba* subsp. *brandegeeae* is threatened by weed control measures, non-native plants, road maintenance, fire suppression, and development (CNPS 2017). Within the Project Area one occurrence of *Clarkia biloba* subsp. *brandegeeae* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along Slab Creek Access Road and southwest of Slab Creek Reservoir. There is three occurrence on a total of 29.2 acres on the ENF (ENF 2017b).

4.2.2.6 *Clarkia virgata (Sierra clarkia)*

Clarkia virgata (Sierra clarkia) is an annual herb in the Onagraceae family. It is possibly threatened by road maintenance and non-native plants (CNPS 2017). Within the Project Area five occurrences of *Clarkia virgata* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) north of Forebay Road, at Jones Fork campground, and on Poho Ridge Road, Gasparni Road, and Parni Spur Road near Poho ridge. There are six occurrences on a total of 1.43 acres on the ENF (ENF 2017b).

4.2.2.7 *Drosera rotundifolia (round-leaved sundew)*

Drosera rotundifolia (round-leaved sundew) is a perennial, carnivorous herb in the Droseraceae family. Within the Project Area four occurrences of *Drosera rotundifolia* were documented in the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016), and/or the ENF 2017 database (2017b) below Ice House Dam. There are 20 occurrences on a total of 0.3 acre on the ENF (ENF 2017b).

4.2.2.8 *Eriogonum ovalifolium var. eximium (brown-margined buckwheat)*

Eriogonum ovalifolium var. *eximium* (brown-margined buckwheat) is a perennial herb in the Polygonaceae family. Within the Project Area one occurrence of *Eriogonum ovalifolium* var. *eximium* was documented in the 2016 surveys (Atkins 2016) and the ENF 2017 database (2017b) below Union Valley bike trail approximately 1,300 feet east of Wolf Creek Spur Rd. There is one occurrence on a total of 0.02 acre on the ENF (ENF 2017b).

4.2.2.9 *Githopsis pulchella subsp. serpentinicola (serpentine bluecup)*

Githopsis pulchella subsp. *serpentinicola* (serpentine bluecup) is an annual herb in the Campanulaceae family. Within the Project Area two occurrences of *Githopsis pulchella* subsp. *serpentinicola* were documented in the 2016 surveys (Atkins 2016) and/or the

ENF 2017 database (2017b) at Powerhouse Road and north of Forebay Road. There is one occurrence on a total of 0.6 acre on the ENF (ENF 2017b).

4.2.2.10 *Glyceria grandis (American manna grass)*

Glyceria grandis (American manna grass) is a perennial rhizomatous herb in the Poaceae family. Within the Project Area two occurrences of *Glyceria grandis* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) at Loon Lake campground. There is one occurrence on a total of 0.1 acre on the ENF (ENF 2017b).

4.2.2.11 *Piperia colemanii (Coleman's piperia)*

Piperia colemanii (Coleman's piperia) is a perennial herb in the Orchidaceae family. Within the Project Area one occurrences of *Piperia colemanii* was documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) across from the Camino Powerhouse. There are 31 occurrences on a total of 2.1 acre on the ENF (ENF 2017b).

4.2.2.12 *Pseudostellaria sierra (Sierra starwort)*

Pseudostellaria sierra (Sierra starwort) is a perennial rhizomatous herb in the Caryophyllaceae family. It is potentially threatened by logging and possibly threatened by vehicles (CNPS 2017). Within the Project Area one occurrence of *Pseudostellaria sierra* was documented in the 2017 survey (ENF 2017b) at Junction Reservoir. There are two occurrences on a total of 0.01 acre on the ENF (ENF 2017b).

4.2.2.13 *Streptanthus longisiliquus (long-fruit jewelflower)*

Streptanthus longisiliquus (long-fruit jewelflower) is a perennial herb in the Brassicaceae family. It is possibly threatened by logging and vehicles (CNPS 2017). Within the Project Area six occurrences of *Streptanthus longisiliquus* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) along roads and along transmission line right of way west of Union Valley Reservoir. There are six occurrences on a total of 11.9 acres on the ENF (ENF 2017b).

4.2.2.14 *Taxus brevifolia (Pacific yew)*

Taxus brevifolia (Pacific yew) is a shrub or small three in the Taxaceae family. Within the Project Area four occurrences of *Taxus brevifolia* were documented in the UARP relicensing surveys (DTA 2004) and/or the ENF 2017 database (2017b) along transmission line right of way. There are 12 occurrences on a total of 9.0 acres on the ENF (ENF 2017b).

4.2.2.15 *Torreya californica (California nutmeg)*

Torreya californica (California nutmeg) is small coniferous tree in the Taxaceae family. It is endemic to California and is an ENF Watch List species. Within the Project Area two occurrences of Torreya californica were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) along Eldorado Powerhouse Road. There are 58 occurrences on a total of 72.9 acres on the ENF (ENF 2017b).

4.2.2.16 *Wyethia reticulata (El Dorado mule ears)*

Wyethia reticulata (El Dorado mule ears) is a perennial herb in the Asteraceae family. It is endemic to California and is an ENF Watch List species.

Within the Project Area one occurrence of *Wyethia reticulata* was documented in 2016 surveys (Atkins 2016) along the Transmission Line near Forebay Road.

5 EFFECTS OF THE PROPOSED PROJECT

5.1 Risk Assessment

The application of herbicides to vegetation requires a careful assessment of risk to human health and the environment, particularly wildlife and plant life; the purpose of this section is to assess the risks to botanical resources of using the herbicides and surfactants prescribed in the VIWMP.

To assess the risk associated with the use of a specific pesticide, SMUD uses Risk Assessment Worksheets (WorksheetMaker, version 6.01.16), which are a computational tool developed by Syracuse Environmental Research Associates, Inc. (SERA) for the USFS. These are models that attempt to quantify the risk to various receptors based on relative toxicity and assumed exposure scenarios, which are typically very conservative and do not consider mitigating Resource Protection Measures employed by applicators. Exposure scenarios are explained in the risk assessment reports for each of these herbicides prepared by SERA. These risk assessments are incorporated by reference and can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml.

These worksheets are designed to assess risk by comparing a potential exposure dose with the daily reference dose (RfD) established by the U.S. EPA (EPA). The RfD is a level of exposure at or below which no acute or chronic health effects are expected to occur; it can be considered the equivalent of an acceptable daily intake. Risk is expressed in the form of a hazard quotient (HQ), which is computed as the ratio of proposed exposure dose to the RfD. HQs $\leq$1.0 are considered by the USFS to pose insignificant risk to human health or the environment. Proposed application rates are listed in Table 4. These spreadsheets have been developed over several years and are continually revised and improved to provide the best possible analysis. The assessment capabilities are not the same for each compound; in each scenario, the best and most plausible scenarios are evaluated.

Table 4. Comparison of the Proposed Chemicals and Application Rates

Chemical	Proposed Maximum Application Rate
Aminopyralid	0.11 a.e. lbs/ac
Chlorsulfuron	0.05 ai lb/ac
Clopyralid	0.14 a.e. lbs/ac
Glyphosate	2 a.e. lbs/ac
Imazapyr	0.33 a.e. lbs/ac
Sulfometuron Methyl	0.14 ai lbs/ac
Triclopyr (TEA)	2 a.e. lbs/ac
Triclopyr (BEE)	2 a.e. lbs/ac

Application rate units: acid equivalent pounds per acre (a.e. lbs./acre)

Identifying the people, aquatic and terrestrial wildlife, and plants likely to be exposed to herbicides due to the project and then estimating doses for these potentially exposed individuals were the basis for the exposure analysis. This analysis estimates potential exposure and projects subsequent risk from pesticide applications. The spreadsheets consider multiple rates along with the volume exposures. The central application rate represents the most likely rate to be prescribed and is the rate that is assessed. Most important to the evaluation is the impact of application volume and the subsequent concentration mixed in the field. All risk assessments consider the range of application volumes, field concentration, and subsequent potential exposures.

Each herbicide-specific spreadsheet analyzes four human and five environmental (plant and animal) risk potentials. Sections 5..2.1 through 5.2.10 provide an analysis of potential effects of the project on non-target, sensitive plants (i.e., those that are tolerant of the applied herbicide) including special-status species.

5.1.1 *Model Assumptions for Drift Analysis*

Documentation from the SERA Worksheet Maker, Version 6.01 User Guide provides information on the assumptions used to determine the risk of drift (Durkin 2016). According to the SERA documentation, the drift model used is from AgDRIFT, a model developed by the EPA. The worksheets use Tier 1 analysis (a generic and simple assessment that should be considered the upper limit of drift). The backpack model was selected in all cases and the model parameters assume that applications would be from a low boom (tractor-based boom, 20 inches (in) from ground) and droplets are assumed to be a distribution of Fine to Medium size (100-250 Microns) with estimates of drift in the

50th percentile, meaning that the model assumes droplets will travel a distance equal to that in which 50% of the droplets traveled in field tests. Drift from an actual backpack application would be much less according to the documentation and there are currently not good models for backpack applications (Durkin 2016).

Many of the applications in the UARP will be actual backpack applications targeting undesirable vegetation with applicators directing the spray. UARP sprayers are equipped with nozzles that produce medium (350 Microns) and greater size droplets, which don't travel as far. Nozzle height can be raised or lowered and is not fixed. Sprays will only occur when wind speeds are less than 5 mph.

5.2 Direct and Indirect Effects

The project could directly affect individual plants of special-status species documented within the Project Area by damaging or destroying them as a result of access to or during manual treatment activities. Special-status species as well as non-target, sensitive plants could also be affected by the direct application of herbicides to individual plants. Table 5 provides the list of ENF Sensitive and ENF Watch List species that could potentially be affected by mechanical treatments and/or direct application of herbicides, including bloom time and locality information for those species that have been documented in the Project Area.

Table 5. Federally list, ENF Sensitive and Watch List species with the potential to occur in the Project Area.

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Federally Listed Species													
Packera layneae	Layne's ragwort	Asteraceae	perennial herb	FT/CR/FSS/1B.2									
ENF Sensitive Species													
Allium tribracteatum	three-bracted onion	Alliaceae	perennial bulbiferous herb	–/–/FSS/1B.2									
Arctostaphylos nissenana	Nissenan manzanita	Ericaceae	perennial evergreen shrub	–/–/FSS/1B.2									
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	Asteraceae	perennial herb	–/–/FSS/1B.3									
Botrychium ascendens	upswept moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.3									
Botrychium crenulatum	scalloped moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2	One occurrence; approximately 0.7 miles west of Schlein Ranger Station								
Botrychium lunaria	common moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.3									
Botrychium minganense	Mingan moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2									
Botrychium montanum	western goblin	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Botrychium paradoxum	paradox moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Botrychium pendunculosum	Stalked moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Calochortus clavatus var.	Pleasant Valley mariposa lily	Liliaceae	perennial bulbiferous herb	–/–/FSS/1B.2	Eight occurrences; throughout Project Area								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time March	April	May	June	July	August	September	October
avius													
Cypripedium montanum	mountain lady's-slipper	Orchidaceae	perennial rhizomatous herb	–/–/FSS/4.2									
Draba asterophora var. *asterophora*	Tahoe draba	Brassicaceae Brassicaceae	perennial herb	–/–/FSS/1B.2									
Draba asterophora var. *macrocarpa*	Cup Lake draba	Brassicaceae	perennial herb	–/–/FSS/1B.1									
Eriogonum tripodum	tripod buckwheat	Polygonaceae	perennial deciduous shrub	–/–/FSS/4.2									
Horkelia parryi	Parry's horkelia	Rosaceae	perennial herb	–/–/FSS/1B.2									
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	Montiaceae	perennial herb	–/–/FSS/3.2									
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	Montiaceae	perennial herb	–/–/FSS/3.2									
Lewisia longipetala	long-petaled lewisia	Montiaceae	perennial herb	–/–/FSS/1B.3									
Lewisia serrata	saw-toothed lewisia	Montiaceae	perennial herb	–/–/FSS/1B.1	Two occurrences; one at Union Valley Reservoir and one at Camino Reservoir								
Mimulus pulchellus	yellow-lip pansy monkeyflower	Phrymaceae	annual herb	–/–/FSS/1B.2									
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	Polemoniaceae	annual herb	–/–/FSS/4.3	One occurrence; under transmission line right of way near Cable Road								
Ophioglossum pusillum	northern adder's-tongue	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2									
Phacelia stebbinsii	Stebbins' phacelia	Hydrophyllaceae	annual herb	–/–/FSS/1B.2	30 occurrences; throughout Project Area including								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
					along access roads to Jaybird Powerhouse and Camino Reservoir, Junction Reservoir, and Union Valley Powerhouse.								
Pinus albicaulis	White Bark Pine	Pinaceae	perennial evergreen tree	–/–/FSS/–		Not applicable							
Poa sierrae	Sierra blue grass	Poaceae	perennial rhizomatous herb	–/–/FSS/1B.3									
Bruchia bolanderi	Bolander's bruchia	Bruchianceae	moss	–/–/FSS/4.2		Not applicable							
Helodium blandowii	Blandow's bog moss	Helodiaceae	moss	–/–/FSS/2B.3		Not applicable							
Meesia uliginosa	broad-nerved hump moss	Meesiaceae	moss	–/–/FSS/2B.2		Not applicable							
Mielichhoferia elongata	elongate copper moss	Mielichhoferiaceae	moss	–/–/FSS/4.3		Not applicable							
Dendrocollybia racemosa	branched collybia	Cudoniaceae	fungi	–/–/FSS/–		Fruits primarily in spring							
Phaeocollybia olivacea	olive phaeocollybia	Cortinariaceae	fungi	–/–/FSS/–		Fruits September through December							
Peltigera gowardii	western waterfan lichen	Peltigeraceae	foliose lichen (aquatic)	–/–/FSS/4.2		Not applicable							
ENF Watch List Species													
Allium sanbornii var. *congdonii*	Congdon's onion	Alliaceae	perennial bulbiferous herb	–/–/FSW/4.3									
Allium sanbornii var. *sanbornii*	Sanborn's onion	Alliaceae	perennial bulbiferous herb	–/–/FSW/4.2									
Astragalus austiniae	Austin's astragalus	Fabaceae	perennial herb	–/–/FSW/1B.3									

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	Fabaceae	perennial herb	–/–/FSW/4.3									
Bolandra californica	Sierra bolandra	Saxifragaceae	perennial herb	–/–/FSW/4.3									
Botrychium simplex	least moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSW/1B.3	One occurrence; at Angel Creek								
Calystegia vanzuukiae	Van Zuuk's morning-glory	Convolvulaceae	perennial rhizomatous herb	–/–/FSW/1B.3									
Carex cyrtostachya	Sierra arching sedge	Cyperaceae	perennial herb	–/–/FSW/1B.2									
Carex davyi	Davy's sedge	Cyperaceae	perennial herb	–/–/FSW/1B.3	Three occurrences; Loon Lake Campground, Gerle Creek Campground, and near the South Fork of the Rubicon River.								
Ceanothus fresnensis	Fresno ceanothus	Rhamnaceae	perennial evergreen shrub	–/–/FSW/4.3	One occurrence; Chaix Mountain								
Chaenactis douglasii var. *alpina*	alpine dusty maidens	Asteraceae	perennial herb	–/–/FSW/2B.3									
Chlorogalum grandiflorum	Red Hills soaproot	Agavaceae	perennial bulbiferous herb	–/–/FSW/1B.2	37 occurrences; throughout Project Area including along the access roads to Brush Creek, Jaybird Powerhouse and Camino Reservoir, the powerline near Poho ridge and the Forebay north of the South Fork American River.								
Clarkia biloba	Brandegee's	Onagraceae	annual herb	–/–/FSW/4.2	Six occurrences; mainly								

Scientific name	**Common name**	**Family**	**Lifeform**	**Status[1] Federal /State/ USFS/ CRPR**	**Location Information within the Project Area**	**Bloom time**							
						March	**April**	**May**	**June**	**July**	**August**	**September**	**October**
subsp. *brandegeeae*	clarkia				around Slab Creek Road southwest of Slab Creek Reservoir								
Clarkia virgata	Sierra clarkia	Onagraceae	annual herb	–/–/FSW/4.3	Five occurrences; including north of Forebay Road, at Jones Fork campground, and on Poho Ridge Road, Gasparni Road, and Parni Spur Road near Poho ridge								
Claytonia megarhiza	fell-fields claytonia	Montiaceae	perennial herb	–/–/FSW/2B.3									
Corallorhiza trifida	northern coralroot	Orchidaceae	perennial rhizomatous herb (achlorophyllous)	–/–/FSW/–									
Drosera anglica	English sundew	Droseraceae	perennial herb (carnivorous)	–/–/FSW/2B.2									
Drosera rotundifolia	Round-leaved sundew	Droseraceae	perennial herb	–/–/FSW/–	Four occurrences; below Ice House Dam								
Dryopteris filix-mas	male fern	Dryopteridaceae	perennial rhizomatous herb	–/–/FSW/2B.4									
Eriogonum ovalifolium var. *eximium*	brown-margined buckwheat	Polygonaceae	perennial herb	–/–/FSW/4.3	One occurrence; below Union Valley bike trail approximately 1,300 feet east of Wolf Creek Spur Rd								
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	Campanulaceae	annual herb	–/–/FSW/4.3	Two occurrences; at transmission line right of way, one at Powerhouse Road and one north of Forebay Road								
Glyceria grandis	American manna grass	Poaceae	perennial rhizomatous herb	–/–/FSW/2B.3	Two occurrences; at Loon Lake campground								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Jensia yosemitana	Yosemite tarweed	Asteraceae	Annual herb	–/–/FSW/3.2									
Mimulus laciniatus	cut-leaved monkeyflower	Phrymaceae	annual herb	–/–/FSW/4.3									
Myrica hartwegii	Sierra sweet bay	Myricaceae	perennial deciduous shrub	–/–/FSW/4.3									
Perideridia bacigalupii	Bacigalupi's yampah	Apiaceae	perennial herb	–/–/FSW/4.2									
Orthotrichum holzingeri	Holzinger's orthotrichum moss	Orthotrichaceae	moss	–/–/FSW/1B.3		Not applicable							
Pinus monophylla	two-needle pinyon pine	Pinaceae	perennial evergreen tree	–/–/FSW/3.3		Not applicable							
Piperia colemanii	Coleman's rein orchid	Orchidaceae	perennial herb	–/–/FSW/4.3									
Piperia leptopetala	narrow-petaled rein orchid	Orchidaceae	perennial herb	–/–/FSW/4.3									
Pseudostellaria sierrae	Sierra starwort	Caryophyllaceae	perennial rhizomatous herb	–/–/FSW/4.2	One occurrence; at Junction Reservoir								
Rhynchospora capitellata	brownish beaked-rush	Cyperaceae	perennial herb	–/–/FSW/2B.2									
Rhynchospora alba	white beaked-rush	Cyperaceae	perennial rhizomatous herb	–/–/FSW/2B.2									
Sparganium natans	small bur-reed	Typhaceae	perennial rhizomatous herb (emergent)	–/–/FSW/4.3									
Sambucus nigra subsp. *caerulea*	blue elderberry	Adoxaceae	shrub	–/–/FSW/–									
Streptanthus	long-fruit	Brassicaceae	perennial herb	–/–/FSW/4.3	Six occurrences; along								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
longisiliquus	jewelflower				roads and along transmission line right of way west of Union Valley Reservoir								
Taxus brevifolia	Pacific yew	Taxaceae	tree	–/–/FSW/–	Four occurrences; along transmission line right of way	Not applicable							
Torreya californica	California nutmeg	Taxaceae	tree	–/–/FSW/–	Two occurrences; along Eldorado Powerhouse Road	Not applicable							
Viburnum ellipticum	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	–/–/FSW/2B.3									
Wyethia reticulata	El Dorado County mule ears	Asteraceae	perennial herb	–/–/FSW/1B.2	One occurrence; transmission line near Forebay Road								

[1] Status:
Federal
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare

–	No state status
USFS	
FSS	USFS Sensitive
FSW	USFS Watch List
California Rare Plant Rank (formerly known as CNPS Lists)	
1B	Plants rare, threatened, or endangered in California and elsewhere
2B	Plants rare, threatened, or endangered in California, but more common elsewhere
3	More information needed about this plant, a review list
4	Plants of limited distribution, a watch list
CNPS Threat Ranks:	
0.1	Seriously threatened in California (high degree/immediacy of threat)
0.2	Fairly threatened in California (moderate degree/immediacy of threat)
0.3	Not very threatened in California (low degree/immediacy of threats or no current threats known)

The risk from direct-impact scenarios will be reduced by implementation of multiple measures as outlined it Section 5 of the VIWMP. These measures include comprehensive surveys for special-status plant and invasive weed populations every five years (PM-8) and annual consultation to review the most current list of special-status plant species and invasive weeds that might occur in the Project Area directly affected by Project operations (PM-9). If any previously unidentified occurrences are noted, then SMUD would manage them according to the provisions in the VIWMP. Prior to mechanical treatment all ENF Sensitive species will be flagged for avoidance; if a treatment (e.g., string trimming) will occur adjacent to an annual species it will be timed to occur once the species has gone to seed. Similarly, for annual ENF Watch List plant species, herbicide applications will be timed to occur once they have set seed where feasible. Direct-impacts to select watch list plants (*Carex davyi, Eriogonum ovalifolium var. eximium, Githopsis pulchella ssp. serpentinicola. Glyceria grandis, Streptanthus longisiliquus,* and *Wyethia reticulata*) that are uncommon on the Eldorado National Forest will also be avoided. Finally, herbicide exclusion buffers will be established for ENF Sensitive Plants as described in the Table 6 below.

Table 6. Herbicide Exclusion Buffers around ENF Sensitive Plants.

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]
Aminopyralid	200
Chlorosulfron	100
Clopyralid	50
Glyphosate	50
Imazapyr	100
Sulfometuron methyl	100
Triclopyr BEE	200
Triclopyr TEA	50

[1] Measured from exterior edge of ENF Sensitive plant occurrence; exceptions for buffer distances can be made when approved by USFS or BLM botanist.

Flagging and buffers around ENF Sensitive plants will not be implemented along specific sections of access roads (Figures 2–4). In these areas potential risks outweigh the benefits; establishing no-spray buffers encourages the proliferation of invasive plants and can create an unsafe situation if vegetation grows tall enough to restrict visibility for drivers and increases fire danger. As indicated in Figures 2–4, two ENF Sensitive species, *Phacelia stebbinsii* and *Calochortus clavatus* var. *avius* are documented in these areas. For these roadside occurrences, herbicide application would likely kill any individuals located within 10 feet of the road shoulder since applications would occur in the spring when both species would be susceptible to herbicide exposure. Prior to 2014 many of these population may have been treated mechanically or with herbicides by SMUD, but all occurrences have been flagged and avoided since 2014 during annual O&M activities.

In many cases the roadside occurrences have been present at least since 2000 through 2003 when surveys were originally performed for the UARP. The southern population of *Phacelia stebbinsii* along Jaybird Powerhouse Road (Figure 2, lower circle) has been documented in all surveys in the area (DTA 2004, CDFW 2017b and Atkins 2016) and has increased in extent. However, much of the population to the north (Figure 2, upper circle) documented by DTA in 2004 was not relocated in 2016 (Atkins 2016). Overall, the *Phacelia stebbinsii* occurrences along Jaybird Powerhouse Road have decreased both in extent and density with over 2,000 individuals observed in 2002 (DTA 2004) in numerous discrete patches in the switchback road cuts along Jaybird Powerhouse Road, and only 775 individuals counted in 2016 at three loci. Additional monitoring by the Forest Service occurred at the northern populations along Jaybird Powerhouse Road (PHST_006-03) in 1999 and 2008. Neither visit included population counts, but it was noted that fewer plants were observed at the site than when it was lasted visited. Much of the decrease in extent has occurred at the northern occurrences (PHST6_006 and PHST6_029). There is also one historic occurrence of *Calochortus clavatus* var. *avius* along Jaybird Canyon Road (Figure 2. upper circle) that was initially discovered in 1993 growing in and above the road cut. However, the population was not relocated in 2000 or 2003 (DTA 2004) or in 2016 (Atkins 2016) and may have been extirpated. For the occurrences of *Phacelia stebbinsii* along Jaybird Powerhouse Road last observed in 2016, it is expected that only a fraction of the occurrences would be impacted by roadside herbicide applications which should allow for the remaining occurrences to persist despite the potential loss of individual plants within 10 feet of the road edge.

Similarly, at Union Valley Reservoir one population of *Phacelia stebbinsii* (Figure 3, lower circle) was documented in multiple surveys in the area since it was discovered in 1979 and the extent and density of the population has remained relatively stable (DTA 2004, CDFW 2017b, and Atkins 2016). Another population (Figure 3, middle circle) has also remained relatively stable since being discovered in 1979, although in 1983 over 1,000 plants were observed but only 400 individuals were noted by Atkins in 2016 (DTA 2004, and Atkins 2016). Therefore, for the populations at Union Valley Reservoir there is some evidence that the populations have persisted despite years of annual mechanical and/or herbicide applications in many cases, although since 2014 the occurrences have been flagged and avoided. This is because the populations of these plants extend beyond the road prism so the loss of individuals adjacent to the road has not impacted the entire population.

For the occurrence of *Phacelia stebbinsii* and *Calochortus clavatus* var. *avius* that are relatively new (i.e., *Phacelia stebbinsii* in Figure 2, right circle; *Calochortus clavatus* var. *avius* Figure 4, right circle [CDFW 2017b, Atkins 2016 and ENF 2017b) they may also persist despite potential loss of individuals from herbicide application or mechanical treatments to the extent that populations extend beyond the road prism. While the *Phacelia stebbinsii* occurrence (PHST6_053-02) extends beyond the road prism the *Calochortus clavatus* var. *avius* (CACLA_142-03) was noted to only occur in the road cut along Crooked Silver Road. Given the limited extent of the population, it is possible that the *Calochortus clavatus* var. *avius* would be extirpated by proposed herbicide application and mechanical roadside vegetation management.

However, even with the potential loss of individuals and potentially a population of *Calochortus clavatus* var. *avius* (CACLA_143-03), both populations represent a small fraction of the total number of occurrences and also extent of these species both within the Project Area and also across the ENF as described in Sections 4.2.1.2 and 4.2.1.5; therefore, the potential loss is not likely to affect species viability or lead to a trend towards federal listing.

UARP Roadside Sensitive Plants

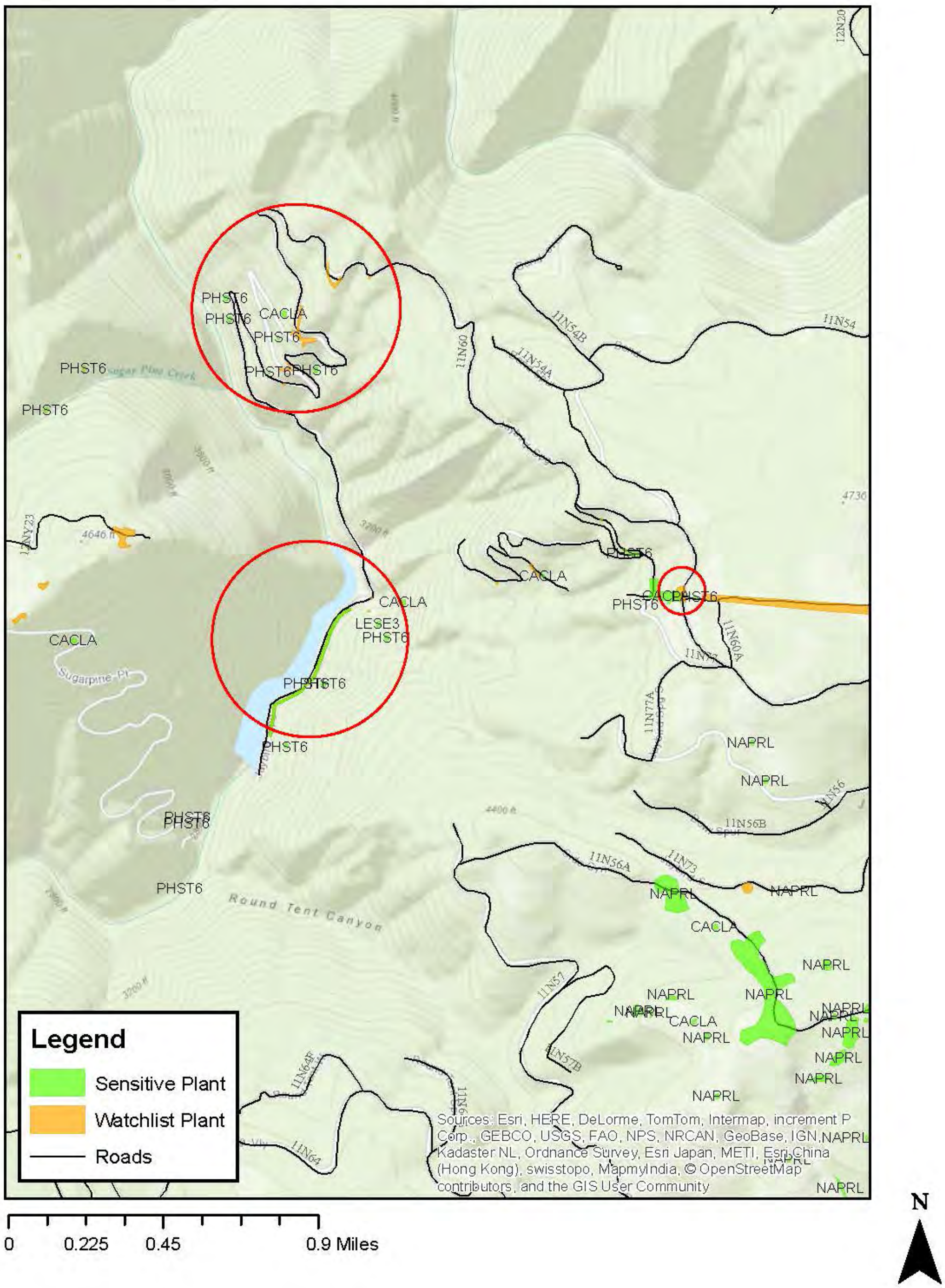


Figure 2. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species along Jaybird Powerhouse Road.

UARP Roadside Sensitive Plants

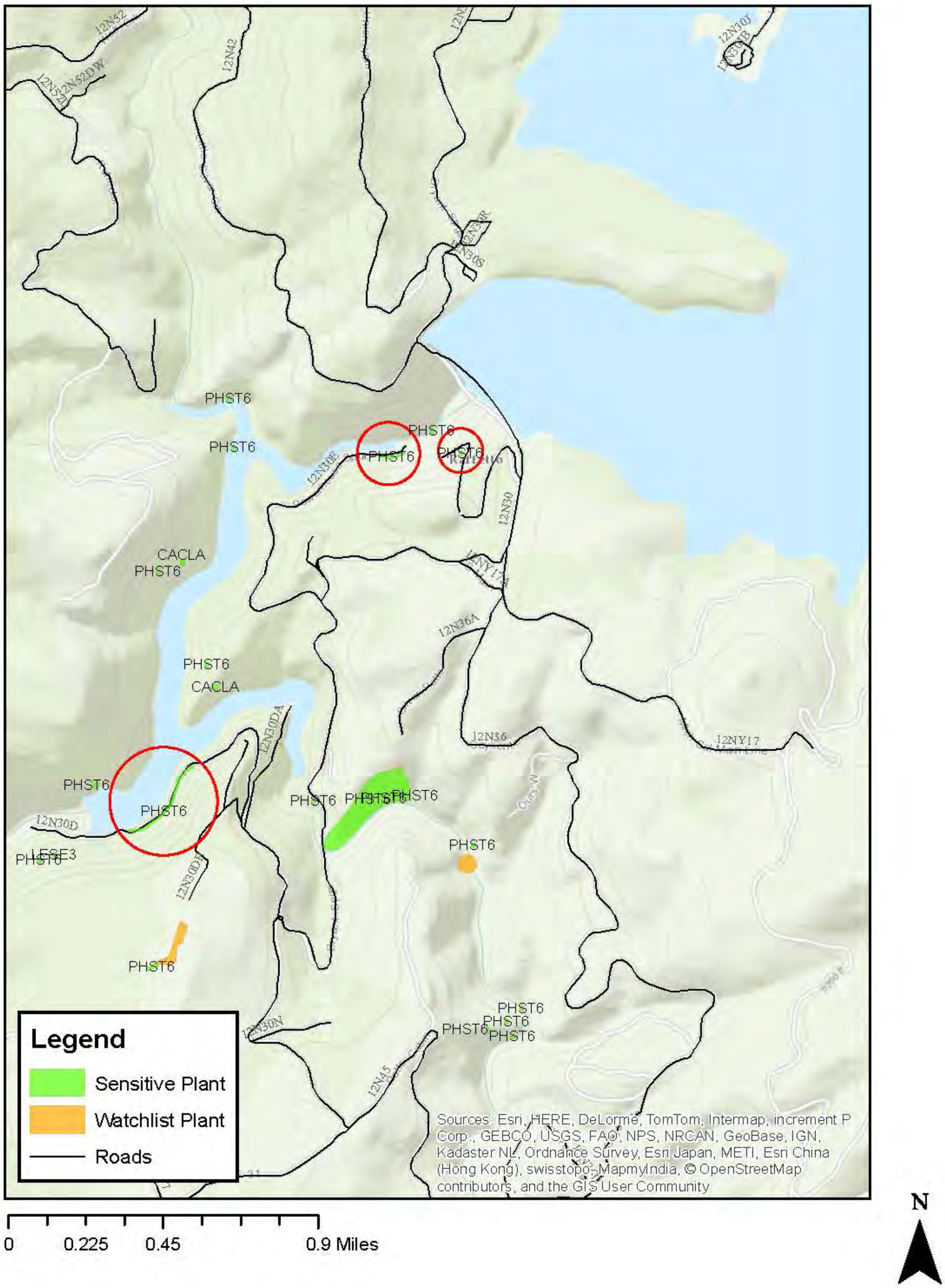


Figure 3. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species near Union Valley Reservoir.

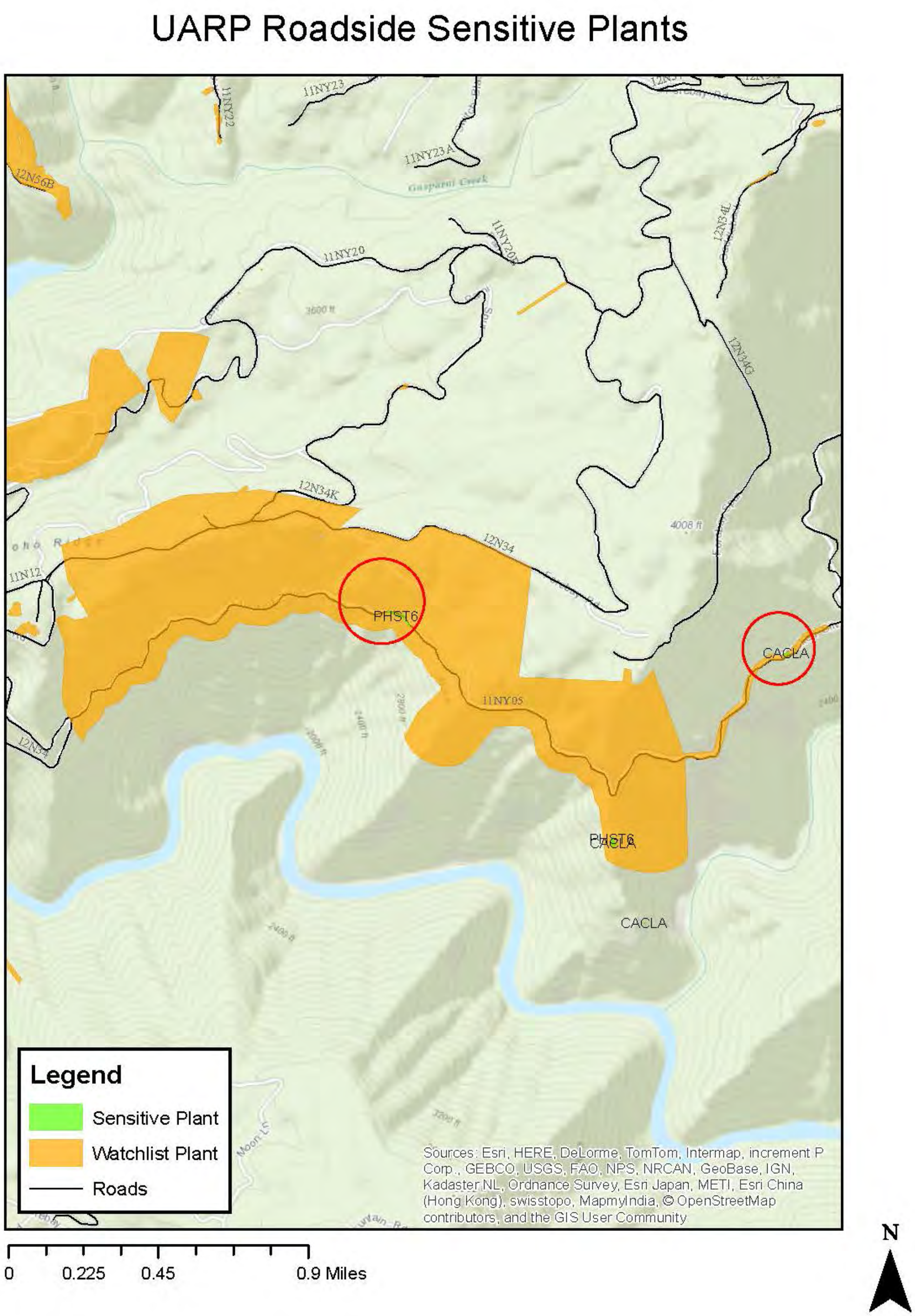


Figure 4. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species along Camino Adit Road (11NY05).

Flagging and buffers around ENF watch-list species that are prevalent within the project area would not occur because avoiding these species would interfere with the SMUD's ability to manage incompatible vegetation. Expected effects of the proposed vegetation management will vary for each species. For *Clarkia biloba* ssp. *brandegeeae* and *Clarkia virgata* SMUD will attempt to delay treatments until after plants have set seed (when feasible). Where plants occur along access roads it is expected that only a fraction of individuals would be impacted by roadside spraying allowing for the population to persist regardless of the timing of herbicide application. However, *Clarkia virgata* occurs within the transmission corridor and could be extirpated if the entire population is sprayed or disturbed prior to seed set.

Chlorogalum grandiflorum is very common throughout the project area with over 82 occurrences documented within transmission corridors, roadways, and recreation areas throughout the project area. Plants would likely tolerate some mechanical disturbance as long as they are not uprooted or buried in thick mulch, but direct herbicide application during periods of active growth will result in loss of individuals and likely some occurrences.

There is only one individual of *Ceanothus fresnensis* documented in the project area within the transmission ROW near Chaix Mountain. It is likely that mechanical and chemical treatments will extirpate this population. *Drosera rotundifolia* is known from the project area below the dam at Ice House Reservoir. Since this population occurs within the stream channel direct impacts from the project are not expected. There are four populations of *Torreya californica* in the project area, two of which occur in the transmission ROW and will likely be impacted. The other two occur along access roads and are unlikely to be targeted during roadside vegetation management. There is only one individual of *Piperia colemanii* in the project area along the access road to the Camino Power house. It is expected that roadside vegetation management will extirpate this population.

Special-status plant species and non-targeted sensitive plants may also be impacted by multiple, indirect effects such as herbicide drift or runoff from adjacent treatments. Drift is the airborne movement of herbicides, usually associated with mechanical application techniques such as sprays. Runoff is the transport of herbicides in water, generally associated with rain, across the landscape and potentially into waterways. Tables 7 and 8 provide HQs for acute exposure scenarios for terrestrial plants and Sections 7.2.1 through 7.2.10 provides an assessment of potential risks to special-status plant species and non-targeted sensitive plants by herbicide. While the HQs may show potential for impacts to the special-status plant species, the analyses are extremely conservative as compared to field studies] and the risk from these indirect impacts will be reduced by implementation of the various protection measures outlined in Section 5 of the VIWMP including the following:

- **BMP-14**: SMUD PCOs will apply chemical treatments according to label directions, prescriptions, and all applicable laws and regulations governing the use of pesticides; pesticide label requirements will be followed. A licensed Pest Control Advisor (PCA) will be consulted in the planning and execution of all herbicide applications. Individuals with a Qualified Applicator's License or Certificate (QAL or QAC) from the California Department of Pesticide Regulation (Cal DPR) will oversee applications on the ground.
- **BMP-15**: When using herbicides, SMUD PCO's will use the most specifically targeted application method that can effectively achieve program goals.
- **BMP-20:**
  - Measures to control pesticide drift during spray application will include, but are not limited to:
    - Using ground-based application equipment;
    - Using spray nozzle that produces >200 micron or greater droplets;
    - Using nozzle pressures below 25 PSI on backpacks;
    - Using spray nozzles no higher than 2 feet from the ground;
    - Using ground application directed away from non-target]vegetation.
  - Drift reduction nozzles may be employed where warranted.
- **BMP-21:** Chemical treatments shall occur when weather and soil conditions are favorable. Application can proceed if weather conditions appear favorable, which is when there is a 30% or less chance of rain on the day of application (according to NOAA); if precipitation is predicted within 48 hours, the amount predicted shall be no more than ¼- inch; sustained winds are less than 5 MPH; and rain does not appear likely at the time of application.

Table 7. Summary of Exposure Assessment[1] and Risk Characterization for Sensitive Terrestrial Plants from Runoff; Clay Soil.[2]

Chemical	Aminopyralid		Chlorsulfuron[3]		Clopyralid		Glyphosate		Imazapyr		Sulfometuron Methyl[4]		Triclopyr (TEA)		Triclopyr (BEE)	
Toxicity value (lb/ac)	*.00048*		*.000035*		*.025*		*3.6*		*.00017*		*.0000086*		*.0028*		*.022*	
Rainfall (in)	EA	HQ[5]	EA	HQ	EA	HQ	EA[6]	HQ	EA[6]	HQ	EA	HQ	EA[6]	HQ	EA[6]	HQ
5	0	0E00	*0*	0E00	*0*	0E00	NA	.05	NA	11	*0*	0E00	NA	8	NA	4
10	0	0E00	*0*	0E00	*0*	0E00	NA	.05	NA	11	*0*	0E00	NA	8	NA	4
15	0.001309	**3**	*0.002251*	**64**	*0.00602*	0.2	NA	.05	NA	11	*0.002352*	**273**	NA	8	NA	4
20	0.001705	**4**	*0.003893*	**111**	*0.0105*	0.4	NA	.05	NA	11	*0.005068*	**589**	NA	8	NA	4
25	0.001969	**4**	*0.005424*	**155**	*0.0147*	0.6	NA	.05	NA	11	*0.008064*	**938**	NA	8	NA	4
50	0.002574	**5**	*0.011184*	**320**	*0.0308*	**1.2**	NA	.05	NA	11	*0.02268*	**2,637**	NA	8	NA	4
100	0.0033	**7**	*0.018576*	**531**	*0.0511*	**2**	NA	.05	NA	11	*0.04648*	**5,405**	NA	8	NA	4
150	0.004015	**8**	*0.023232*	**664**	*0.06342*	**3**	NA	.05	NA	11	*0.06328*	**7,358**	NA	8	NA	4
200	0.004752	**10**	*0.026448*	**756**	*0.07168*	**3**	NA	.05	NA	11	*0.07112*	**8,270**	NA	8	NA	4

1 EA (Exposure Assessment): The equivalent rate of runoff as a percent of the original application rate; measured in lbs/ac.
2 Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
3 Chlorsulfouron HQs exceed 1 for loam soils at rainfall ranges between 100 and 200 in
4 Sulfometuron methyl HQ's exceed 1 for loam soils when rain fall exceeds 50 in
6 The scenario did not present rain fall and projected runoff, just HQ's so the worst case is listed.
NA= Data is Not Available

Table 8. Summary of Exposure Assessment[1] and Risk Characterization for Sensitive Terrestrial Plants from Drift After Backpack Directed Foliar Application.[2]

Chemical	Aminopyralid		Chlorsulfuron		Clopyralid		Glyphosate		Imazapyr		Sulfometuron Methyl		Triclopyr (TEA)		Triclopyr (BEE)	
Toxicity value (lb/ac)	.0002		.0000088		.0005		.0013		.000064		.00024		.0028		.0028	
Feet	**EA**	**HQ**[2]	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**
0	*0.11*	**550**	*0.048*	**5,455**	*0.14*	**280**	*2*	**1,538**	*0.33*	**5,156**	*0.14*	**5,833**	*2*	**714**	*2*	**714**
25	*0.000915*	**5**	*0.00168*	**191**	*0.001165*	**2**	*0.01664*	**13**	*0.002746*	**43**	*0.001165*	**49**	*0.01664*	**6**	*0.01664*	**6**
50	*0.000476*	**2**	*0.000850*	**97**	*0.000606*	**1.2**	*0.00866*	**7**	*0.001429*	**22**	*0.000606*	**25**	*0.00866*	**3**	*0.00866*	**3**
100	*0.000265*	**1.3**	*0.000455*	**52**	*0.000337*	0.7	*0.00482*	**4**	*0.000795*	**12**	*0.000337*	**14**	*0.00482*	**1.7**	*0.00482*	**1.7**
300	*0.000104*	0.5	*0.000168*	**19**	*0.000132*	0.3	*0.001882*	**1.4**	*0.000311*	**5**	*0.000132*	**5**	*0.001882*	0.7	*0.001882*	0.7
500	*0.000064*	0.3	*0.000100*	**11**	*0.000082*	0.2	*0.001158*	0.9	*0.000191*	**3**	*0.000081*	**3**	*0.001158*	0.4	*0.001158*	0.4
900	*0.000034*	0.2	*0.000052*	**6**	*0.000044*	9E-02	*0.000624*	0.5	*0.000103*	**1.6**	*0.000044*	**1.8**	*0.000624*	0.2	*0.000624*	0.2

1 EA (Exposure Assessment): The equivalent rate of drift as a percent of the original application rate; measured in lbs/ac.
2 Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.

Special-status plant species may also be indirectly impacted through competition from invasive plants. The implementation of the VIWMP would potentially increase establishment and spread of invasive weeds in certain areas where native cover is reduced (e.g., underneath transmission lines); however the plan is designed to manage populations of invasive species and implement measures to reduce their spread as outlined in Section 5 of the VIWMP and described below in Section 7.2. Preparing and implementing the VIWMP is one of the environmental measures in the UARP FERC License to protect native species.

Finally special-status species may be indirectly impacted by mechanical treatment if the timing of treatment is not considered; implementation of the various protection measures outlined in Section 5 of the VIWMP including avoidance of mechanical weed trimming in areas where invasive plants have already set seed will ensure that seeds are not spread during such treatments.

5.2.1 *Aminopyralid (Milestone)*

There is some risk to sensitive non-target plants associated with the application of Milestone. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Milestone that exceed the level of concern. Applications made at sites with high clay content soils where rainfall exceeds 15 in per year can produce runoff with a HQ that exceeds a level of concern (Table 7). This evaluation scenario assumes broadcast applications to an entire area; however, application of this herbicide in the project will be limited to spot foliar and limited broadcast treatments. This herbicide does have pre-emergent activity; however, the intent is to apply it primarily as a post-emergent herbicide and rely on the soil activity to inhibit subsequent germination and growth within the area treated. Treatments will not attempt to eliminate all vegetation. Risk is greatest on clay soils, which are not typically found in the Project Area, and are significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

The risk from drift will be further reduced considering the primary use of Milestone will be the selective control of thistle and broom, application will be limited to spot foliar and limited broadcast foliar treatments and drift management protection measures as described in Section 5 of the VIWMP will also be employed. In addition, ENF Sensitive species will be flagged and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP.

5.2.2 *Chlorsulfuron (Telar XP®)*

There is some risk to sensitive non-target plants associated with the application of Telar. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Telar that exceed the level of concern which would impact seedling germination. Applications made at sites with high clay content soils where rainfall exceeds 15 in per year can produce runoff with a HQ that exceeds a level of concern (Table 7). The primary use of Telar will be for vegetation control in substations and switch yards and use on canal berms were runoff will be limited due to site engineering/conditions. Risk is greatest on clay soils, which are not typically found in the Project Area, and is significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Chlorsulfuron off target as far away as 900 ft (Table 8). The risk from drift will be reduced considering the applications will be made with a backpack sprayer except for switch yards and other areas requiring bare ground condition and drift management protection measures as described in Section 5 of the VIWMP will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.3 *Clopyralid*

There is some risk to sensitive non-target plants associated with the application of Clopyralid. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Clopyralid that exceed the level of concern. A HQ of 1.2 was established for terrestrial plants that could be impacted as a result of runoff (Table 7). This involves the most sensitive species during a precipitation event approaching 100 in on clay soils. Risk is greatest on clay soils, which are not typically found in the Project Area, and is significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff. Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Clopyralid up to 50 ft from an application (Table 8);.) The risk from drift will be reduced considering the applications will be made with a drift reduction methods on back pack sprayers and drift management protection measures as described in Section 5.2, Table 4 will be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.4 *Glyphosate*

Runoff is unlikely due the physical properties of Glyphosate, specifically its tendency to tightly bind to all soil types immediately following application (Table 7). However, drift is a concern with any post–emergent application (Table 8). Drift scenarios for this assessment represent an extreme case, HQs exceed a level of concern to 300 ft. At 300 ft the equivalent rate is .0018 lbs/ac which is less than .1% of the prescribed rate. Low pressure backpack applications proposed in the VIWMP will be such that drift potential will be reduced significantly. This will be accomplished by the use of directed foliar applications and drift reduction methods as described in Section 5.2 of the VIWMP which will minimize contamination of non-target vegetation. Other aspects of the application process will ensure that non-target, terrestrial plants will not be adversely affected by the use of Glyphosate include the resource protection measures outlined in Section 5 of the VIWMP regarding wind speed and weather. Finally, ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.5 *Imazapyr*

There is some risk to sensitive non-target plants associated with the application of Imazapyr. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Imazapyr that exceed the level of concern (Table 7). This can occur when considering the central and upper application exposure potential for sensitive plants and the upper most exposure potential for tolerant plants. Runoff is a function of application rate, nature of application and timing of application relative to rainfall. The risks associated with runoff will be reduced based on multiple factors. First, directed low volume foliar and low-volume basal treatments will be applied and no broadcast applications will be made. Second, the risks are reduced significantly in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Imazapyr 900 ft from an application (Table 8). The scenarios analyzed consider a low boom mechanized application. However, no broadcast applications will be made; Imazapyr will be applied with directed low volume foliar and low-volume basal treatments and the protection measures as proposed in the VIWMP will minimize drift during the application of Imazapyr. ENF Sensitive species will be flagged for and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.6 *Sulfometuron methyl*

There is some risk to sensitive non-target plants associated with the application of Sulfometuron methyl. Sulfometuron methyl is soil-active and persistent; some scenarios project that runoff of sulfometuron methyl is possible and could result in concentrations that will exceed the HQ and potentially impact seedling germination. These scenarios occur when rainfall amounts exceed 15 in and clay soils are present and HQs for runoff on clay were well above a level of concern when rainfall amounts approached 20 in

(Table 7). Runoff potential is reduced significantly on loam and sandy soils which are more common in the Project Area (SNEP 1996). Soil movement and subsequent runoff will be mitigated by site engineering given that Sulfometuron methyl will only be applied to engineered compacted surfaces within substations and switchyards. Furthermore, field studies determined that in practice sulfometuron methyl is relatively immobile as pH, loam and sand and high organic matter reduce runoff. This result was observed even when application rates were three times those that are prescribed for the plan (Odell, 1998). Therefore, in practice, impacts to non-target terrestrial vegetation are expected to be low to non-existent.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying sulfometuron methyl to a distance greater than 900 ft for sensitive plants and 100 ft for tolerant species (Table 8). The risk from drift will be greatly reduced considering this application will be used for switchyards, parking and access roads where bare ground is required and all other applications for this project will be made with low-pressure, low-volume backpack applicators. Drift management protection measures as described in Section 5 of the VIWMP will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIMWP; these actions will further protect special-status species during the application of this herbicide.

5.2.7 *Triclopyr (TEA)*

There is some risk to sensitive non-target plants associated with the application of Trilopyr (TEA; Table 7). Impacts due to runoff could be significant and are based on considerations for annual rainfall, application timing and application surface. Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

There is also potential for Triclopyr (TEA) drift to adversely impact sensitive species; drift Scenarios produce HQ>1 up to 100 ft from application target (Table 8Drift will be mitigated using low-pressure, low-volume backpack sprayer applications and drift management protection measures as described in Section 5.2, Table 6 will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.8 *Triclopyr (BEE) –Garlon 4*

Impacts due to runoff could be significant and are based on considerations for time of application, rainfall amount and application method; runoff is a concern where the highest levels of exposure and application rates are considered (Table 7). It is deemed unlikely that a scenario would exist where runoff would impact non-target sensitive species due to prevalent soil types (i.e., sandy loams) and proposed application method (basal).Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

There is potential for Triclopyr (BEE) drift to adversely impact sensitive species that are within 100 ft of the application site (Table 8). In general, tolerant species would be impacted as a result of a direct spray only. However, the scenario considered for Triclopyr (BEE) is per foliar applications. The proposed VIWMP plan application for Garlon 4 is a basal application with a nozzle pressure below 20 psi, directed at the lower 12-18 in of the stem, with nozzle distance no more than 3 in from the stem . Based on extensive field experience from licensed Pest Control Advisor, this will minimize drift and limit off-target movement to less than ten ft. Furthermore, the potential for volatility will be mitigated as this application will be made later in the season when temperature is cooler and strict guidelines on the PCR that address volatility mitigation will be followed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.9 *Triclopyr (TCP)*

Assessments are not available for terrestrial plants regarding Triclopyr TCP as it is a metabolite that has no activity on plants.

5.2.10 *Colorants and Surfactants*

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions and Best Management Practices. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species. Surfactants and colorants alone are not phtyto active to the point they would increase the risk to non-target sensitive plants beyond the potential risks for each herbicide as analyzed above. Furthermore, there are no documented instances of synergistic effects (Bakke 2007).

6 DETERMINATION OF EFFECTS

6.1 Federally Listed Species

Implementation of the VIWMP will have no effect on *Packera layneae* given that the species is currently not documented and potential habitat does not occur in the Project Area. If *Packera layneae* were documented on NFS lands in the project areaConsultation with U.S. Fish and Wildlife Service may be required.

6.2 ENF Sensitive Species

Implementation of the VIWMP would not affect for ENF Sensitive species decribed in Table 9. There are no known occurrences or suitable habitat within the project area.

Implementation of the VIWMP may impact individual plants but will not likely contribute to a trend towards federal listing for the following ENF Senstive species as described in Table 9.

Table 9. ENF Sensitive species potentially affected by implementation of the VIWMP.

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Vascular			
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium montanum	western goblin	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium pendunculosum	stalked moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
			towards federal listing
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	No Effect; outside of the Project Area elevation range
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	No Effect; outside of the Project Area elevation range
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia longipetala	Long-petaled lewisia	–/–/FSS/1B.3	No Effect; outside of the Project Area elevation range
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Pinus albicaulis	white bark pine	–/–/FSS/–	No; outside of the Project Area elevation range
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	May affect individuals but not likely to affect species

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
			viability or lead to a trend towards federal listing
Bryophytes			
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Fungi			
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lichens			
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

[1] Status:

Federal
FT Federally listed as threatened
– No federal status

State
CR California State listed as rare
– No state status

USFS
FSS USFS Sensitive
FSW USFS Watch List

California Rare Plant Rank (formerly known as CNPS Lists)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

7 INVASIVE PLANT RISK ASSESSMENT

The Sierra Nevada Forest Plan Amendment ROD (January 2004) contains standards and guidelines aimed at reducing the spread of noxious weeds in Sierra Nevada National Forests. One of these standards requires a noxious weed risk assessment for all NEPA analyses. The purpose of the risk assessment is to identify vectors and changes in habitat that might favor the introduction of new invasive plants into a proposed project area, or might further spread invasive plants that already exist within the project boundaries; then to apply the appropriate invasive plant prevention practices to reduce the threat.

7.1 Invasive Plants Occurrences Within the Project Area

ENF provided a list of target invasive plants (nonnative plants of management concern in the ENF) and infestation data (known invasive plant occurrences) for the Project Area

(Appendix E). The list includes nonnative invasive plant species in the following ENF categories:

- Group 1 (Eradicate): highly invasive species known to occur in the ENF that are targeted for inventory, control and eradication;
- Group 2 (Control): established or widespread species known to occur in the ENF which are targeted for inventory and annual treatment of a portion of known infestations;
- Group 3 (Control): established or widespread species known to occur in the ENF which are targeted for inventory and treatment of isolated leading edge infestations or where concurrent with higher priority infestations.
- Group 4 (Manage through education and prevention): species well established across the ENF or have minor economic or ecological impacts that are targeted for appropriate prevention and education measures to limit further spread; and
- Potential Invasives: species not yet found in the ENF but that will be targeted for eradication or control if located.

Information on known invasive plant infestations (using a combination of DTA 2004, Atkins 2016, and ENF 2017c spatial data) was compiled and plotted on a GIS map. Twenty target invasive plant species have been documented (Table 10).

Table 10. Invasive Plants Documented in the Project Area.

Scientific name [Hickman 1993]	Common name	Cal-IPC[1]	Occurrence			Documentation Source
			Number of occurrences	Approximate total number of plants	Sum of acres	
Group 1 (Eradicate)						
Aegilops triuncialis	barbed goat grass	High	23	6,734	74.9	Atkins 2016, DTA 2004, ENF 2017b
Centaurea stoebe subsp. *micranthos*	spotted knapweed	High	1	6	<1	ENF 2017b
Lepidium latifolium	perennial pepperweed	High	3	64	<1	Atkins 2016, ENF 2017b
Group 2 (Control)						
Carduus pycnocephalus subsp. *pycnocephalus*	Italian thistle	Moderate	2	2	<1	Atkins 2016, ENF 2017b
Centaurea melitensis	tocalote	Moderate	3	505	<1	Atkins 2016, ENF 2017b
Centaurea solstitialis	yellow star-thistle	High	21	25,708	41.3	Atkins 2016, DTA 2004, ENF 2017b
Chondrilla juncea	skeleton weed	Moderate	64	29,115	172.1	Atkins 2016, DTA 2004, ENF 2017b

Scientific name	Common name	Cal-	Occurrence			Documentation
Cytisus scoparius	Scotch broom	High	22	1,117	19.2	Atkins 2016, DTA 2004, ENF 2017b
Elymus caput-medusae [*Taeniatherum caput-medusae*]	medusa head	High	8	2,174	32.4	Atkins 2016, ENF 2017b
Group 3 (Control)						
Dysphania botrys [*Chenopodium botrys*]	Jerusalem oak	None	14	2,031	68.7	Atkins 2016, ENF 2017b
Brassica nigra	black mustard	Moderate	13	260	17.3	Atkins 2016
Bromus tectorum	cheat grass, downy chess	High	127	770,880	279.5	Atkins 2016, DTA 2004, ENF 2017b
Cirsium vulgare	bull thistle	Moderate	119	6,833	240.0	Atkins 2016, ENF 2017b
Hypericum perforatum subsp. *perforatum*	Klamathweed	Moderate	141	81,646	282.8	Atkins 2016, ENF 2017b
Leucanthemum vulgare	ox-eye daisy	Moderate	2	10	<1	Atkins 2016, ENF 2017b
Melilotus officinalis	yellow sweetclover	None	78	646,719	198.1	Atkins 2016, ENF 2017b
Rubus armeniacus [*Rubus discolor*]	Himalayan blackberry	High	34	2,214	28.6	Atkins 2016
Group 4 (Manage)						
Bromus diandrus	ripgut brome	Moderate	*	*	*	DTA 2004
Potential Invasives						
Tanacetum vulgare	common tansy	Moderate	2	*	<1	Atkins 2016, ENF 2017b

[1] Cal-IPC:
High—Species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Moderate—Species having substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure.
[2] Insufficient data in data sources.

7.1.1 *Aegilops triuncialis (barbed goatgrass)*

Aegilops triuncialis (barbed goatgrass) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to Mediterranean Europe and western Asia, it is found throughout much of northern and central California, from the Coast Ranges to the Sierra Nevada. *Aegilops triuncialis* grows at elevations from 0 to 1,000 m in disturbed sites, cultivated fields, and roadsides (Baldwin et al. 2012), as well as disturbed and undisturbed grasslands (DiTomaso and Healy 2007). It flowers from May to July (Baldwin et al. 2012). Within the Project Area, 23 occurrences of *Aegilops triuncialis* were documented over approximately 74.9 acres (Atkins 2016, ENF 2017c).

7.1.2 *Brassica nigra (black mustard)*

Brassica nigra (black mustard) is an annual herb in the Brassicaceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is found throughout the California Floristic Province at elevations up to 1,500 m (Baldwin et al. 2012). It is common along roadsides and in disturbed areas, fields, and grasslands (DiTomaso and Healy 2007). *Brassica nigra* flowers from April to September (Baldwin et al. 2012). Within the Project Area, 13 occurrences of *Brassica nigra* were documented over approximately 17.3 acres (Atkins 2016).

7.1.3 *Bromus diandrus (ripgut brome)*

Bromus diandrus (ripgut brome) is an annual herb in the Poaceae family with a Cal-IPC rating of Moderate and ENF Group 4 rating. Native to Europe, it is found throughout California at elevations below 2,170 m. *Bromus diandrus* occupies open, generally disturbed areas, and blooms from February to July (Baldwin *et al*. 2012). Within the Project Area, one occurrences of *Bromus diandrus* was (DTA 2004).

7.1.4 *Bromus tectorum (cheat grass)*

Bromus tectorum (cheat grass) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 3 rating. Native to Eurasia, it is commonly found throughout California in open, disturbed areas at elevations below 3,400 m. *Bromus tectorum* blooms from May to August (Baldwin et al. 2012). Within the Project Area, 127 occurrences of *Bromus tectorum* were documented over approximately 279.5 acres (Atkins 2016, ENF 2017c).

7.1.5 *Carduus pycnocephalus subsp. pycnocephalus (Italian thistle)*

Carduus pycnocephalus subsp. *pycnocephalus* (Italian thistle) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to the Mediterranean, it is commonly found in much of western California, the Sacramento

Valley, and the Sierra Nevada foothills at elevations below 1,200 m. *Carduus pycnocephalus* subsp. *pycnocephalus* inhabits roadsides, pastures, and disturbed areas, and blooms from March to July (Baldwin et al. 2012). Within the Project Area, two occurrences of *Carduus pycnocephalus subsp. pycnocephalus* were documented over approximately 0.5 acre (Atkins 2016, ENF 2017c).

7.1.6 *Centaurea melitensis (tocalote)*

Centaurea melitensis (tocalote) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to southern Europe, it is commonly found throughout the California Floristic Province and is uncommon in the Desert Province. *Centaurea melitensis* inhabits disturbed fields and open woodlands below 2,200 m and blooms from April to July (Baldwin et al. 2012). Within the Project Area, three occurrences of *Centaurea melitensis* were documented over approximately 0.2 acre (Atkins 2016, ENF 2017c).

7.1.7 *Centaurea solstitialis (yellow star-thistle)*

Centaurea solstitialis (yellow star-thistle) is a winter annual herb in the Asteraceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to southern Europe, it aggressively reproduces by seed. *Centaurea solstitialis* is common below 1,300 m throughout the California Floristic Province and Mojave Desert (Baldwin et al. 2012) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed sites such as roadsides and waste places (DiTomaso and Healy 2007). It flowers from May through October (Baldwin et al. 2012). Within the Project Area, 21 occurrences of *Centaurea solstitialis* were documented over approximately 41.3 acres (Atkins 2016, ENF 2017c).

7.1.8 *Centaurea stoebe subsp.micranthos (spotted knapweed)*

Centaurea stoebe subsp. *micranthos* (spotted knapweed) is a biennial to short-lived perennial herb in the Asteraceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to southeastern Europe, it aggressively reproduces by seed. *Centaurea stoebe subsp. micranthos* is common below 2,600 m (Baldwin et al. 2012) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed sites such as roadsides and waste places (DiTomaso and Healy 2007). It flowers from July through September (Baldwin et al. 2012). Within the Project Area, one occurrence of *Centaurea stoebe* subsp. *micranthos* was documented over approximately 0.9 acre (ENF 2017c).

7.1.9 *Chondrilla juncea (skeleton weed)*

Chondrilla juncea (skeleton weed) is a biennial or occasional perennial in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to Eurasia, the Mediterranean, and northwest Africa, it is found in California primarily in the Great

Valley and less commonly in the Cascade, North Coast, and South Coast ranges and San Francisco Bay at elevations up to 600 m. *Chondrilla juncea* inhabits pastures and disturbed places, and blooms from June to January (Baldwin et al. 2012). Within the Project Area, 64 occurrences of *Chondrilla juncea* were documented over approximately 172.1 acres (Atkins 2016, ENF 2017c).

7.1.10 *Cirsium vulgare (bull thistle)*

Cirsium vulgare (bull thistle) is a biennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Eurasia, it is commonly found throughout the California Floristic Province and Great Basin at elevations below 2,350 m. *Cirsium vulgare* inhabits disturbed areas and blooms from May to October (Baldwin et al. 2012). Within the Project Area, 119 occurrences of *Cirsium vulgare* were documented over approximately 240 acres (Atkins 2016, ENF 2017c).

7.1.11 *Cytisus scoparius (Scotch broom)*

Cytisus scoparius (Scotch broom) is a shrub in the Fabaceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to southern Europe and northern Africa, this shrub can grow up to 2.5 m tall. In California it is commonly found below 1,000 meters in Northwestern California, north and central Sierra Nevada foothills, Great Valley, San Francisco Bay Area, South Coast, and San Bernardino Mountains. *Cytisus scoparius* inhabits disturbed places and blooms from April through July (Baldwin et al. 2012). Within the Project Area, 22 occurrences of *Cytisus scoparius* were documented over approximately 19.2 acres (Atkins 2016, ENF 2017c).

7.1.12 *Dysphania botrys (Jerusalem oak)*

Dysphania botrys (Jerusalem oak) is an annual herb in the Chenopodiaceae family with an ENF Group 3 rating. Native to Europe and Asia, it is found throughout California at elevations below 2,100 m. *Dysphania botrys* inhabits disturbed areas and blooms from June to October (Baldwin et al. 2012). Within the Project Area, 14 occurrences of *Dysphania botrys* were documented over approximately 68.7 acres (Atkins 2016, ENF 2017c).

7.1.13 *Elymus caput-medusae (medusa head)*

Elymus caput-medusae (medusa head) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to Eurasia, in California it is found in the Klamath Range, North Coast Range, Cascade Range, Sierra Nevada Foothills, Great Valley, South Coast Range, and the Modoc Plateau. *Elymus caput-medusae* inhabits disturbed areas below 2,000 m and blooms from April to July (Baldwin et al. 2012). Within the Project Area, eight occurrences of *Elymus caput-medusae* were documented over approximately 32.4 acres (Atkins 2016, ENF 2017c).

7.1.14 *Hypericum perforatum subsp. perforatum (Klamathweed)*

Hypericum perforatum subsp. *perforatum* (Klamathweed) is a perennial herb in the Hypericaceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is commonly found in Northwestern California, the Cascade Range, north and central Sierra Nevada, and the Sacramento Valley, with limited distribution elsewhere in the California Floristic Province. *Hypericum perforatum* subsp. *perforatum* inhabits open, disturbed areas at elevations from six to 1,980 m, and blooms from May to August (Baldwin et al. 2012). Within the Project Area, 141 occurrences of *Hypericum perforatum subsp. perforatum* were documented over approximately 282.8 acres (Atkins 2016, ENF 2017c).

7.1.15 *Lepidium latifolium (perennial pepperweed)*

Lepidium latifolium (perennial pepperweed) is a rhizomatous, perennial herb in the Brassicaceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to Eurasia, it is found throughout California with the exception of the Klamath Range and the Desert Province. *Lepidium latifolium* is commonly found in pastures, disturbed areas, fields, grasslands, saline meadows, streambanks, sagebrush scrub, pinyon/juniper woodlands, and edges of marshes. It grows at elevations below 2,500 m and blooms from June to September (Baldwin et al. 2012). Within the Project Area, three occurrences of *Lepidium latifolium* were documented over approximately .04 acre (Atkins 2016, ENF 2017c).

7.1.16 *Leucanthemum vulgare (ox-eye daisy)*

Leucanthemum vulgare (ox-eye daisy) is a rhizomatous, perennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is widely naturalized in the North Coast, Klamath Range, North Coast Range, Cascade Range, north and central Sierra Nevada, Sacramento Valley, Central Coast, San Francisco Bay, Peninsular Range, and the Modoc Plateau. *Leucanthemum vulgare* inhabits disturbed areas, and meadows and seeps below 2,600 m, and blooms from June to August (Baldwin et al. 2012). Within the Project Area, two occurrences of *Leucanthemum vulgare* were documented over approximately 0.3 acre (Atkins 2016, ENF 2017c).

7.1.17 *Melilotus officinalis (yellow sweetclover)*

Melilotus officinalis (yellow sweetclover) is an annual or occasionally biennial herb in the Fabaceae family with and ENF Group 3 rating. Native to Eurasia, it is found throughout California at elevations below 2,300 m. *Melilotus officinalis* inhabits open fields and disturbed sites, and blooms from May to August (Baldwin et al. 2012). Within the Project Area, 78 occurrences of *Melilotus officinalis* were documented over approximately 198.1 acres (Atkins 2016, ENF 2017c).

7.1.18 *Rubus armeniacus (Himalayan blackberry)*

Rubus armeniacus (Himalayan blackberry) is a shrub in the Rosaceae family with a Cal-IPC rating of High and ENF Group 3 rating. Native to Eurasia, this climbing shrub can grow up to three meters tall. Common below 1,600 m throughout the California Floristic Province, habitat types include disturbed moist areas such as roadsides, fence rows, fields, and canal and ditch banks, but also natural riparian areas (Baldwin et al. 2012, DiTomaso and Healy 2007). *Rubus armeniacus* blooms from March through June (Baldwin et al. 2012). Within the Project Area, 34 occurrences of *Rubus armeniacus* were documented over approximately 28.6 acres (Atkins 2016).

7.1.19 *Tanacetum vulgare (common tansy)*

Tanacetum vulgare (commona tansy) is a perennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Potential Invasives rating. Native to Europe, it occurs in disturbed areas below 2,000 m. *Tanacetum vulgare* blooms from June through August (Baldwin et al. 2012). Within the Project Area, two occurrences of *Tanacetum vulgare* were documented over approximately 0.5 acre (Atkins 2016, ENF 2017c).

7.2 Invasive Weed Prevention Measures

The entire list of protection measures designed for terrestrial and human resources is provided in Section 5 of the VIWMP. The following are the specific measures outlined to address invasive weed prevention:

- **PM-12:** Annual effectiveness monitoring (see Section 3.2) will include monitoring of invasive weed infestations that have been treated. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments are needed.
- **PM-13**: New populations of invasive weeds will be inventoried and mapped during regularly described monitoring, and will be subsequently incorporated into the scheduled annual treatment.
- **PM-14:** Control methods will be determined by species, location, and season to facilitate the control of invasive/noxious weeds, as part of the annual maintenance work.
- **PM-15:** Management of invasive weeds will follow the management guidelines identified by the ENF and other stakeholders.
- **PM-16:** IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance or removal of shade and native vegetation or topsoil.
- **PM-17:** IVM shall be staged and begun in non-infested areas and then will move to infested areas.

- **PM-18:** Contractors and other staff will be required to clean vehicles and equipment prior to working on the National Forest; when moving from an infested unit to a weed-free unit, vehicles and equipment will be inspected. Vehicles will be washed by contractor at their business or at SMUD's Fresh Pond facility.
- **PM-19:** Areas in which ground-disturbing activity has occurred, and in which there is the potential to introduce invasive weeds, will be monitored for 3 years.
- **PM-20:** Weed-free materials, including certified weed-free straw or mulch, will be used wherever possible for erosion control, as these materials are available, with the county of origin stating the material was inspected. Local stockpiles and materials will be kept weed free with regular treatment.
- **PM-21:** Lay-down and staging areas will be designated outside of areas infested with weeds, or the sites will be treated prior to work.
- **PM-22:** Facility sites will be maintained to limit the introduction and spread of invasive plants; heavily used facilities will be regularly treated to prevent the spread of weeds.
- **PM-23:** Mechanical weed trimming will not be used to manage occurrences of listed invasive weeds if those weeds have already set seeds.
- **PM-24**: The USFS botanist will approve seed mixes used for erosion control or restoration.

7.3 Risk Assessment

Table 9 is adapted from Appendix L of the Draft Environmental Impact Report for the Sierra Nevada Forest Plan Amendment.

Table 9. Invasive Plant Risk Assessment Worksheet

Factors to consider	Components	Conditions	Risk Level
Invasive Plant Spread Factors not Connected to Proposed Action (Pre-Existing Circumstances)			
1. Inventory	Is there an adequate site-specific map showing acres by weed species and estimating number of infestations and acres? ***Completed survey of site.***	**Yes**	**Continue with risk assessment**
		No	Complete inventory first
2. Known noxious weeds	Number of A, B, or C rated weeds species in project area. *ENF has a new Priority 1-4 system.* ***Species documented within the Project Area are listed in Section 7.1, Table 10; there are a total of three Group 1 and six Group 2 species which are the highest priority for inventory and control.***	None present or adjacent	Prevention high priority, no control necessary
		Only low priority species present	Prevention high priority, control low priority.
		High priority species present	**Incoming prevention lower priority, but high priority to prevent weed spread within and from project area.**
3. Habitat vulnerability	Previous disturbance, plant species composition, soil cover, shade, soil type,	Open habitat or high previous disturbance	High current vulnerability to

Factors to consider	Components	Conditions	Risk Level
	aspect, moisture. ***Portions of the Project Area are heavily maintained (e.g., transmission lines, power houses), other areas moderately maintained (e.g., roads) and large portions of the Project Area are minimally maintained (perimeters of reservoirs, uplands) and therefore disturbance factors are variable.***		weed invasion
		Moderate cover, moderate previous disturbance.	**Moderate current vulnerability**
		High cover, mostly native plant species, low disturbance	Low current vulnerability
4. Vectors unrelated to proposed project	Existing roads and trails, traffic use, livestock, wildlife migration, wind patterns, drainage flow direction, etc. ***Level of public use is unknown but presumed to be moderate due to roads.***	Abundant vectors	High current vulnerability
		Moderate current vectors	**Moderate current vulnerability**
		Few current vectors	Low current vulnerability
Invasive Plant Spread Factors Related to the Proposed Action			
5. Habitat alteration expected as a result of the project	Logging prescriptions, road construction, fuels prescriptions, change in grazing management or recreation use, intensity or extent of disturbance. ***New ground disturbance presumed low-moderate; proposed action–including implementation of the various protection measures outlined in Section 7.2 above –is designed to maintain a desirable environmental condition that is consistent with the safe and effective operation and maintenance of UARP features. These desired conditions entail reducing cover of native vegetation in and around UARP features, increasing the long-term susceptibility of the project area to invasive plant establishment and spread.***	High ground disturbance, canopy and duff removal	High risk
		Moderate disturbance, canopy and duff removal	**Moderate risk**
		Low disturbance, minimal duff removal, shade retained	Low risk
6. Increased vectors as a result of project implementation	Road construction, facility construction, and amount of project related traffic plus personnel, tools, and materials such as mulch brought into the project. ***Project will only minimally increase the traffic to the site due to periodic treatment and monitoring.***	Road or facility construction	High risk
		Temporary roads, short-term traffic increase	Moderate risk
		No access improvement, minimal project-related traffic increase	**Low risk**
7. Mitigation measures	Prevention (equipment washing, weed-free materials, monitoring), control of existing infestations, effective cultural practices (maintain shade, minimize ground disturbance, design project to reduce weed flow). ***Protection measures described in Section 7.2 above.***	No mitigation measures implemented	Higher risk
		Some mitigation measures implemented	Moderately reduced risk
		Implement all relevant mitigation measures	**Greatly reduced risk**
Overall Assessment of Risk for Project			
8. Anticipated weed response to proposed action	Tally "high risk" responses in previous sections, consider mitigation if it is adopted as part of the proposed action and incorporated into the decision document.	Numerous high risk factors	High potential for significant increase of weed spread as a result of project implementation.
		Few high risk factors	**Moderate potential for spread**

Factors to consider	Components	Conditions	Risk Level
		No high risk factors	Low potential for weed spread

7.4 Determination of Effects

The overall number and size of existing weed populations is moderate but there are a number of high priority infestations known in the project area that should be prioritized for treatment before they spread further in the project area. Additionally project activities are expected to increase the risk of invasive plant establishment and spread by treating incompatible native vegetation that currently interferes with operation of UARP features. With the expected reduction/alteration of native plant cover there is a greater risk of existing and new invasive species spreading in the project area. However, these risks are expected to be reduced by resource protection measures included in the project to prevent invasive plant introduction and spread, as well as the annual monitoring/treatment to control spread of invasive weeds. Therefore, the overall risk for the spread of invasive weeds as a result of project activities is **moderate** considering the resource protection measures described Section 7.2 above.

8 LITERATURE CITED

Atkins. 2016. Botanical Surveys Performed in Support of the Vegetation and Invasive Weed Management Plan. Prepared for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

Bakke, D. 2007. Analysis of issues Surrounding the Use of Spray Adjuvants with Herbicides. Original 2002, revision 2007. US Forest Service. http://www.fs.fed.us/r6/invasiveplant-eis

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

CDFW (California Department of Fish and Wildlife). 2016a. Special vascular plants, bryophytes, and lichens list. Quarterly publication. Prepared by CDFW, Sacramento, California.

CDFW. 2017b. California Natural Diversity Database. RareFind5. Website. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data [Access January 2017.] Prepared by California Department of Fish and Game, Natural Heritage Division, Sacramento, California.

CNPS (California Native Plant Society), Rare Plant Program. 2017. Inventory of Rare and Endangered Plants (online edition, version 8-02). California Native Plant Society, Sacramento, California. Website. http://www.rareplants.cnps.org [Accessed January 2017].

DiTomaso, J.M., E.A. Healy. 2007. Weeds of California and other western states. UCANR Publications.

DTA (Divine Tarbell and Associates). 2004. Special-status plants and invasive/noxious weeds technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

ENF (Eldorado National Forest). 2016. Threatened, endangered, and sensitive plants known to occur or with suitable habitat on the ENF, May 3, 2016.

ENF. 2017a. Eldorado National Forest watch list species, January 26, 2017.

ENF. 2017b. Eldorado National Forest TESP Geodatabase, 2017.

ENF. 2017C. Eldorado National Forest Invasive Plant Geodatabase, 2017

Hickman, J. C., editor. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, California.

Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A Guide to wildlife habitats of California. State of California Resources Agency, Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp

Odell, Shelley. 1998. Environmetal Fate of Sulfometuron-Methyl; Environmental Monitoring and Pest Management Department of Pesticide Regulation, Sacramento, CA95814 1999 Dell

SMUD (Sacramento Municipal Utility District) et al. 2007. Relicensing Settlement Agreement for the Upper American River Project and Chili Bar Hydroelectric Project. Sacramento Municipal Utility District, Sacramento, CA.

SMUD. 2008. Final Historic Properties Management Plan, Version 2. October.

SNEP (Sierra Nevada Ecosystem Project). 1996. Final report to Congress. Sierra Nevada Ecosystems. Vol 1. Ch 1. http://ceres.ca.gov/snep/pubs/web/PDF/v1_ch01.pdf; USGS DDS-43, Sierra Nevada Ecosystems

USFS (U.S. Department of Agriculture, Forest Service). 1989. Land and Resource Management Plan. Pacific Southwest Region. USDA Forest Service.

USFS. 2004. Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement. Record of Decision. Pacific Southwest Region. Vallejo, CA.

USFS. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. April.

USFS. 2016. CALVEG Zone 3: North Sierra. Website. https://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192 [Accessed February 2017].

USFWS (U.S. Fish and Wildlife Service). 2009. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project Number 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

USFWS. 2017. IPac information for planning and conservation. Website. http://ecos.fws.gov/ipac/ [Accessed 19 January 2017].

Appendices

Appendix A

Rare Natural Communities Documented in the Project Vicinity

Table A-1. Rare natural communities documented in the Project Vicinity.

Natural community (Holland 1986)	Source	Rank[1] (Global /State)	Elevation (m)	Habitat description[2]
Lava cap	ENF	-/-	1,200-1,463	Herb and grass dominated openings within the Upper Montane Chaparral formed on very rocky and volcanic soils eroded from Mehrten formation mudflow.
Fens	CNDDB	G2/S1.2	1,174–3,643	Peat-forming wetlands supported by nearly constant groundwater flow.[3]
Sphagnum Bog	CNDDB	G3/S1.2	300–1,820	In cold, highly acid, permanently waterlogged soils that are low in available nutrients. Dominated by a dense growth of low-growing, herbaceous perennials and low shrubs. The growing season is limited to summer at high elevations. Most flowering occurs in the first half of the growing season.

[1] Status:

Global Rank

G2 **Imperiled**: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 **Vulnerable**: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

State Rank

S1 **Critically Imperiled:** Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S3 **Vulnerable:** Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

Additional Threat Ranks

0.2 Threatened

[2] Source: Holland (1986) unless otherwise noted.

[3] Bedford and Godwin 2003.

Appendix B

Special-status Plants Documented in the Project Vicinity

Table B-1. Special-status plants documented in the Project vicinity[1].

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Vascular Plants									
Allium sanbornii var. *congdonii*	Congdon's onion	–/–/FSW/4.3	CNPS	Alliaceae	perennial bulbiferous herb	April–July	300–990	Serpentinite or volcanic soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Allium sanbornii var. *sanbornii*	Sanborn's onion	–/–/FSW/4.2	CNPS	Alliaceae	perennial bulbiferous herb	May–September	260–1,510	Usually serpentinite or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Alliium tribracteatum	three-bracted onion	–/–/FSS/1B.2	ENF	Alliaceae	perennial bulbiferous herb	April–August	1,100– 3,000	Volcanic soils, in lower and uppoer montane coniferous and chaparral forest	Yes; potential habitat in the Project Area.
Arabis rigidissima var. *demota*	Galena Creek rockcress	–/–/–/1B.2	CNPS, CNDD B	Brassicaceae	perennial herb	July–August	2,255–2,560	Rocky soils in broadleafed upland forestand upper montane coniferous forest	Yes; potential habitat in the Project Area.
Arctostaphylos mewukka subsp. *truei*	True's manzanita	–/–/–/4.2	CNPS	Ericaceae	perennial evergreen shrub	February–July	425–1,390	Sometimes roadside in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	CNPS, CNDD B, ENF	Ericaceae	perennial evergreen shrub	February–March	450–1,100	Rocky soils in closed-cone coniferous forest and chaparral	Yes; potential habitat in the Project Area.
Artemisia tripartita subsp. *tripartita*	threetip sagebrush	–/–/–/2B.3	CNPS, CNDD B	Asteraceae	perennial shrub	August	2,200–2,600	Rocky or volcanic soils in openings in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Astragalus	Austin's	–/–/FSW/1B.3	CNPS,	Fabaceae	perennial	(May), July–	2,440–2,970	Rocky soils in alpine	No; outside

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
austiniae	astragalus		CNDDB, ENF		herb	September		boulder and rock field and subalpine coniferous forest	of the Project Area elevation range.
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	–/–/FSW/4.3	CNPS	Fabaceae	perennial herb	July–August	2,135–3,050	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	Yes; potential habitat in the Project Area.
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	ENF	Asteraceae	perennial herb	March–June	90–1,555	Sometimes serpentinite soils in chaparral, cismontane woodland, and valley and foothill grasslands	Yes; potential habitat in the Project Area.
Boechera tularensis	Tulare rockcress	–/–/–/1B.3	CNPS, CNDDB	Brassicaceae	perennial herb	(May), June–July (August)	1,825–3,350	Rocky slopes and sometimes roadsides in subalpine coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Bolandra californica	Sierra bolandra	–/–/FSW/4.3	CNPS, ENF	Saxifragaceae	perennial herb	June–July	975–2,450	Mesic, rocky soils in lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	CNPS, CNDDB	Ophioglossaceae	perennial rhizomatous herb	July–August	1,115–2,700	Mesic soils in lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area.
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	June–September	1,268–3,280	Bogs and fens, lower montane coniferous forest, meadows and seeps, freshwater marshes and swamps and upper montane coniferous forest	Yes; documented in the Project Area (CDFW 2017b).
Botrychium lunaria	Common	–/–/FSS/2B.3	ENF	Ophioglossa	perennial	August	1,980–3,400	Meadows and seeps in	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	moonwort			ceae	rhizomatous herb			subalpine coniferous forest and upper montane coniferous forest	potential habitat in the Project Area.
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	July–September	1,455–2,180	Mesic soila in Bogs and fens, lower montane coniferous forest, edges of meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium montanum	western goblin	–/–/FSS/2B.1	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	July–September	1,465–2,180	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	CNPS, ENF	Ophioglossaceae	perennial rhizomatous herb	August	1,740–4,200	Limestone and marble alpine boulder and rock fields and moist areas of Upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium simplex	least moonwort	–/–/FSW/2B.3	ENF	Ophioglossaceae	perennial rhizomatous herb	May–September	1,500–3,200	In saturated moss or sedge mats around hard water seeps and streamlets.	Yes; documented in the Project Area (ENF 2017b).
Brasenia schreberi	watershield	–/–/–/2B.3	CNPS, CNDDB	Cabombaceae	perennial rhizomatous herb	June–September	30–2,200	Freshwater marshes and swamps	Yes; potential habitat in the Project Area.
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	CNPS, CNDDB, ENF	Liliaceae	perennial bulbiferous herb	May–July	305–1,800	Josephine silt loam and volcanic soils in lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016,

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									CDFW 2017b & ENF 2017b).
Calystegia vanzuukiae	Van Zuuk's morning-glory	–/–/FSW/1B.3	CNPS, CNDDB, ENF	Convolvulaceae	perennial rhizomatous herb	May–August	500–1,180	Gabbro, serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Carex cyrtostachya	Sierra arching sedge	–/–/FSW/1B.2	CNPS, CNDDB, ENF	Cyperaceae	perennial herb	May–August	610–1,360	Mesic areas in lower montane coniferous forest, meadows and seeps, marshes and swamps, and the margins of riparian forests	Yes; potential habitat in the Project Area.
Carex davyi	Davy's sedge	–/–/FSW/1B.3	CNPS, CNDDB, ENF	Cyperaceae	perennial herb	May–August	1,500–3,200	Subalpine coniferous forest, upper montane coniferous forest	Yes; potential habitat in the Project Area.
Carex lasiocarpa	woolly-fruited sedge	–/–/–/2B.3	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	June–July	1,700–2,100	Bogs and fens and freshwater marshes and swamps along lake margins	Yes; potential habitat in the Project Area.
Carex limosa	mud sedge	–/–/–/2B.2	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	June–August	1,200–2,700	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, upper montane coniferous forest	Yes; potential habitat in the Project Area.
Carex tahoensis	Tahoe sedge	–/–/–/4.3	CNPS	Cyperaceae	perennial rhizomatous herb	July–August	2,835–3,810	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range.
Ceanothus fresnensis	Fresno ceanothus	–/–/FSW/4.3	CNPS, ENF	Rhamnaceae	perennial evergreen shrub	May–July	900–2,103	Openings in cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									(ENF 2017b).
Chaenactis douglasii var. *alpina*	alpine dusty maidens	–/–/FSW/2B.3	CNPS, CNDDB	Asteraceae	perennial herb	July–September	2,865–3,400	Granitic soils in alpine boulder and rock field	No; outside of the Project Area elevation range.
Chlorogalum grandiflorum	Red Hills soaproot	–/–/FSW/1B.2	CNPS, CNDDB, ENF	Agavaceae	perennial bulbiferous herb	May–June	245–1,690	Serpentinite, gabbroic and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b).
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	–/–/FSW/4.2	CNPS, CNDDB, ENF	Onagraceae	annual herb	May–July	75–915	Often roadcuts in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Clarkia virgata	Sierra clarkia	–/–/FSW/4.3	CNPS, ENF	Onagraceae	annual herb	May–August	400–1,615	Cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Claytonia megarhiza	fell-fields claytonia	–/–/FSW/2B.3	CNPS	Montiaceae	perennial herb	July–September	2,600–3,532	In crevices between rocks in alpine boulder and rock field and rocky of gravelly soils of subalpine coniferous forest	No; outside of the Project Area elevation range.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Claytonia parviflora subsp. *grandiflora*	streambank spring beauty	–/–/–/4.2	CNPS	Montiaceae	annual herb	February–May	250–1,200	rocky soils in cismontane woodland	Yes; potential habitat in the Project Area.
Corallorhiza trifida	northern coralroot	–/–/FSW/4.3	ENF	Orchidaceae	perennial rhizomatous herb (achlorophyllous)	June – July	1,370–1,745	Mesic soils in lower montane coniferous forest and at edges of meadows and seeps	Yes; potential habitat in the Project Area.
Cordylanthus tenuis subsp. *brunneus*	serpentine bird's-beak	–/–/-/4.3	CNPS	Orobanchaceae	annual herb (hemiparasitic)	July–August	305–915	Usually serpentinite soils in closed-cone coniferous forest, chaparral, and cismontane woodland	Yes; potential habitat in the Project Area.
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	ENF	Orchidaceae	perennial rhizomatous herb	March – August	185–2,225	In roadleafed upland forest, cismontane woodland, lower montane coniferous forest, and north Coast coniferous forest	Yes; potential habitat in the Project Area.
Delphinium hansenii subsp. *ewanianum*	Ewan's larkspur	–/–/–/4.2	CNPS	Ranunculaceae	perennial herb	March–May	60–600	Rocky soils in cismontane woodland and valley and foothill grassland	Yes; potential habitat in the Project Area.
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	ENF	Brassicacea	perennial herb	July–August (September)	2,500–3,505	Alpine boulder and rock field in subalpine coniferous forest	No; outside of the Project Area elevation range.
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	CNPS, CNDDB, ENF	Brassicaceae	perennial herb	July–August (September)	2,500–2,815	Rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range.
Drosera anglica	English sundew	–/–/FSW/1B.1	ENF	Droseraceae	perennial herb	June–September	1,300–2,255	Bogs and fens, meadows and seeps with mesic soil	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
					(carnivorous)				habitat in the Project Area.
Drosera rotundifolia	Round-leaved sundew	–/–/FSW/–	ENF	Droseraceae	perennial herb	June–September	0–2,700	Swamps, wet meadows, forests, peatlands, often with Sphagnum	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & ENF 2017b).
Dryopteris filix-mas	male fern	–/–/FSW/2B.4	ENF	Dryopteridaceae	perennial rhizomatous herb	June–September	2,400–3,100	Granitic, rocky soils in upper montane coniferous forests	No; outside of the Project Area elevation range.
Epilobium howellii	subalpine fireweed	–/–/-/4.3	ENF	Onagraceae	perennial stoloniferous herb	July –August	2,000–3,120	Mesic soils in meadows and seeps, and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Epilobium oreganum	Oregon fireweed	–/–/–/1B.2	CNPS	Onagraceae	perennial herb	June–September	500–2,240	Mesic areas of bogs and fens, lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Erigeron eatonii var. *nevadincola*	Nevada daisy	–/–/–/2B.3	CNPS	Asteraceae	perennial herb	May–July	1,400–2,900	Rocky soils in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland	Yes; potential habitat in the Project Area.
Erigeron miser	starved daisy	–/–/–/1B.3	CNPS, CNDDB	Asteraceae	perennial herb	June–October	1,84–2,620	Rocky soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Eriogonum	brown-	–/–/FSW/4.3	ENF	Polygonacea	perennial	June– August	1,800–3,400	Granitic and sandy soils	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
ovalifolium var. *eximium*	margined buckwheat			e	herb			in alpine boulder and rock field, and subalpine coniferous forest	documented in the Project Area (Atkins 2016 & ENF 2017b).
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	CNPS, ENF	Polygonacea e	perennial deciduous shrub	May–July	200–1,600	Often serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Eriogonum umbellatum var. *torreyanum*	Donner Pass buckwheat	–/–/–/1B.2	CNPS, CNDD B	Polygonacea e	perennial herb	July–September	1,855–2,620	Volcanic or rocky soils in meadows and seeps and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	–/–/FSW/4.3	ENF	Campanulac eae	annual herb	May–June	320–610	Serpentinite or lone soils in cismontane woodland	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Glyceria grandis	American manna grass	–/–/FSW/2B.3	CNPS, CNDD B, ENF	Poaceae	perennial rhizomatou s herb	June–August	15–1,980	Bogs and fens, meadows and seeps, and marshes and swamps along streambanks and lake margins	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Hackelia amethystina	amethyst stickseed	–/–/–/4.3	CNPS	Boraginacea e	perennial herb	June–July (August)	1,500–2,315	Openings and disturbed areas in lower montane coniferous forest, meadosw and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Horkelia parryi	Parry's	–/–/FSS/1B.2	CNPS,	Rosaceae	perennial	April–	80–1,070	Lone formation and other	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	horkelia		CNDDB, ENF		herb	September		soils in chaparral and cismontane woodland	potential habitat in the Project Area.
Jensia yosemitana	Yosemite tarplant	–/–/–/3.2	ENF	Asteraceae	annual herb	(April), May – July	1,200–2,300	Lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area.
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	CNPS, ENF	Montiaceae	perennial herb	(April), May–August	765–2,365	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	CNPS, ENF	Montiaceae	perennial herb	(April), May–August	1,465–2,365	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	CNPS, CNDDB, ENF	Montiaceae	perennial herb	July–August (September)	2,500–2,925	Granitic soils in alpine boulder and rock field and mesic rocky areas of subalpine coniferous forest	No; outside of the Project Area elevation range.
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	CNPS, CNDDB, ENF	Montiaceae	perennial herb	May–June	770–1,435	Mesic areas, rocky slopes in broadleafed upland forest, lower montane coniferous forest, and riparian forest	Yes; documented in the Project Area (CDFW 2017b).
Lilium humboldtii subsp. *humboldtii*	Humboldt lily	–/–/–/4.2	CNPS	Liliaceae	perennial bulbiferous herb	May–July (August)	90–1,280	Openings in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Mimulus laciniatus	cut-leaved monkeyflower	–/–/FSW/4.3	ENF	Phrymaceae	annual herb	April – July	490–2,650	Mesic, granitic soils in chaparral, lower montane coniferous forest, and	Yes; potential habitat in the

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
								upper montane coniferous forests	Project Area.
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	ENF	Phrymaceae	annual herb	April – July	600–2,000	Vernally mesic, often disturbed areas, clay, lower montane coniferous forest, meadows and seeps	Yes; potential habitat in the Project Area.
Myrica hartwegii	Sierra sweet bay	–/–/FSW/4.3	CNPS, ENF	Myricaceae	perennial deciduous shrub	May–June	150–1,750	Cismontane woodland, lower montane coniferous forest, and riparian forest	Yes; potential habitat in the Project Area.
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	CNPS, ENF	Polemoniaceae	annual herb	May–July	853–1,402	Chaparral and cismontane woodland	Yes; documented in the Project Area (ENF 2017b).
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	July	1,000–2,000	Meadows and seeps and the margins of marshes and swamps	Yes; potential habitat in the Project Area.
Packera layneae	Layne's ragwort	FT/CR/FSS/1B.2	ENF, CNPS, CNDDB, USFWS	Asteraceae	perennial herb	April–August	200–1,085	Serpentinite or gabbroic rocky soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Perideridia bacigalupii	Bacigalupi's yampah	–/–/FSW/4.2	ENF	Apiaceae	perennial herb	June – August	450–1,035	Serpentinite soils in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	CNPS, CNDDB, ENF	Hydrophyllaceae	annual herb	May–July	610–2,010	Cismontane woodland, lower montane coniferous forest, and meadows and seeps	Yes; documented in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									(DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b).
Pinus albicaulis	white bark pine	–/–/FSS/–	ENF	Pinaceae	perennial evergreen tree	N/A	2,000–3,700	Upper red-fir forest to timberline, especially subalpine forest	No; outside of the Project Area elevation range.
Pinus monophylla	two-needle pinyon pine	–/–/FSW/3.3	ENF	Pinaceae	perennial evergreen tree	N/A	1,300–2,700	Lower montane coniferous forest and pinyon and juniper	Yes; potential habitat in the Project Area.
Piperia colemanii	Coleman's rein orchid	–/–/FSW/4.3	CNPS, ENF	Orchidaceae	perennial herb	June–August	1,200–2,300	Often sandy soils in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Piperia leptopetala	narrow-petaled rein orchid	–/–/FSW/4.3	ENF	Orchidaceae	perennial herb	May–July	380–2,225	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	CNPS, CNDDB, ENF	Poaceae	perennial rhizomatous herb	April–July	365–1,500	Openings in lower montane coniferous forest	Yes; potential habitat in the Project Area.
Polystichum lonchitis	northern holly fern	–/–/–/3	CNPS	Dryopteridaceae	perennial rhizomatous herb	June–September	1,800–2,600	Granitic or carbonate soils in subalpine coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Potamogeton epihydrus	Nuttall's ribbon-	–/–/–/2B.2	CNPS, CNDD	Potamogetonaceae	perennial rhizomatou	(June), July–September	369–2,172	Assorted shallow freshwater marshes and	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	leaved pondweed		B		s herb			swamps	habitat in the Project Area.
Pseudostellaria sierrae	Sierra starwort	–/–/FSW/4.2	CNPS, ENF	Caryophyllaceae	perennial rhizomatous herb	May–August	1,225–2,194	Chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (ENF 2017b).
Rhamnus alnifolia	alder buckthorn	–/–/–/2B.2	CNPS, CNDDB	Rhamnaceae	perennial deciduous shrub	May–July	1,370–2,130	Lower montane coniferous forest, meadows and seeps, riparian scrub, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Rhynchospora alba	white beaked-rush	–/–/FSW/2B.2	ENF	Cyperaceae	perennial rhizomatous herb	June – August	60–2,040	Bogs and fens, meadows and seeps and freshwater marshes and swamps	Yes; potential habitat in the Project Area.
Rhynchospora capitellata	brownish beaked-rush	–/–/FSW/2B.2	CNPS, CNDDB	Cyperaceae	perennial herb	July–August	45–2,000	Mesic soils in lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Rorippa subumbellata	Tahoe yellow cress	–/CE/–/1B.1	CNPS, CNDDB	Brassicaceae	perennial rhizomatous herb	May–September	1,890–1,905	Decomposed granitic beaches in lower montane coniferous forest, and meadows and seeps	Yes; potential habitat in the Project Area.
Sambucus nigra subsp. *caerulea*	blue elderberry	–/–/FSW/–	ENF	Adoxaceae	shrub	March – September	0–3,000	Streambanks and open places in forest	Yes; potential habitat in the Project Area.
Schoenoplectus subterminalis	water bulrush	–/–/–/2B.3	CNPS, CNDD	Cyperaceae	perennial rhizomatou	June–August (September)	750–2,250	Bogs and fens and marshes and swamps	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
			B		s herb			along montane lake margins	habitat in the Project Area.
Scutellaria galericulata	marsh skullcap	–/–/–/2B.2	CNPS, CNDD B	Lamiaceae	perennial rhizomatou s herb	June–September	0–2,100	Lower montane coniferous forest, mesic meadows and seeps, and marshes and swamps	Yes; potential habitat in the Project Area.
Silene occidentalis subsp. *occidentalis*	Western campion	–/–/–/4.3	CNPS	Caryophylla ceae	perennial herb	June–August	1,230–2,090	Dry, open sites, sometimes rocky soils in chaparral, lower montane coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Sparganium natans	small bur-reed	–/–/FSW/4.3	ENF	Typhaceae	perennial rhizomatou s herb (emergent)	June – September	1,625–2,500	Bogs and fens, meadows and seeps, marshes and swamps, along lake margins	Yes; potential habitat in the Project Area.
Sphaeralcea munroana	Munro's desert mallow	–/–/–/2B.2	CNPS, CNDD B	Malvaceae	perennial herb	May–June	2,000–2,000	Great Basin scrub	Yes; potential habitat in the Project Area.
Stachys pilosa	hairy marsh hedge-nettle	–/–/–/2B.3	CNPS, CNDD B	Lamiaceae	perennial rhizomatou s herb	June–August	1,200–1,770	Mesic Great Basin scrub and meadows and seeps	Yes; potential habitat in the Project Area.
Streptanthus longisiliquus	long-fruit jewelflower	–/–/FSW/4.3	ENF	Brassicaceae	perennial herb	April–September	715–1,500	Openings in cismontane woodland, lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Stuckenia filiformis subsp. *alpina*	slender-leaved pondweed	–/–/–/2B.2	CNPS, CNDD B	Potamogeton aceae	perennial rhizomatou s herb	May–July	300–2,150	Assorted shallow freshwater marshes and swamps	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Taxus brevifolia	Pacific yew	–/–/FSW/–	ENF	Taxaceae	tree	Not applicable	10–2,150	Dense, mixed-evergreen forests, lower slopes, and canyon bottoms	Yes; documented in the Project Area (DTA 2004 & ENF 2017b).
Torreya californica	California nutmeg	–/–/FSW/–	ENF	Taxaceae	tree	Not applicable	10–2,100	Shady moist canyons in forest or woodland, occasionally chaparral	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Viburnum ellipticum	oval-leaved viburnum	–/–/FSW/2B.3	CNPS, CNDDB	Adoxaceae	perennial deciduous shrub	May–June	215–1,400	Chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Viola tomentosa	felt-leaved violet	–/–/–/4.2	CNPS, CNDDB	Violaceae	perennial herb	(April), May–October	1,435–2,000	Gravelly soils in lower montane coniferous forest, subalpine coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & CDFW 2017b)
Wyethia reticulata	El Dorado County mule ears	–/–/FSW/1B.2	ENF	Asteraceae	perennial herb	April – August	185–230	Clay or gabbroic soils in chaparral, cismontane woodland and lower montane coniferous forest	No; outside of the Project Area elevation range.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Fungi									
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	ENF	Cudoniaceae	fungi	fruits primarily in spring	160–1,827	Common under conifers in mature moist coniferous forests in northern CA and the Pacific Northwest. Typically associated with very rotten wood[4]	Yes; potential habitat in the Project Area.
Phaeocollybia olivacea	olive phaeocollybi a	–/–/FSS/–	ENF	Cortinariace ae	fungi	fruits September–December	6–962	Grows on ground in mixed woods and under conifers in southern Oregon and northern California[4]	Yes; potential habitat in the Project Area.
Lichens									
Peltigera gowardii	western waterfan lichen,	–/–/FSS/4.2	CNPS, CNDD B, ENF	Peltigeracea e	foliose lichen (aquatic)	Not applicable	1,065–2,620	On rocks in cold water creeks with little or no sediment or disturbance in riparian forests	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Bryophytes									
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	CNPS, ENF	Bruchiancea e	moss	Not applicable	1,700–2,800	Damp soils in lower montane coniferous forest, meadosw and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	ENF	Helodiaceae	moss	Not applicable	1,862–2,700	Damp soil in meadows and seeps and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	CNPS, CNDD B	Meesiaceae	moss	Not applicable	1,210–2,804	Damp soil in bogs and fens, meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	ENF	Mielichhofer iaceae	moss	Not applicable	0–1,960	Metamorphic rock, usually acidic, usually vernally mesic, often roadsides, sometimes carbonate, broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest , meadows and seeps, and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Orthotrichum holzingeri	Holzinger's orthotrichum moss	–/–/FSW/1B.3	ENF	Orthotrichac eae	moss	Not applicable	715–1,800	Usually on rock in and along streams, rarely on tree limbs, in cismontane woodland, lower	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
								montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest	

[1] Project Vicinity: the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

[2] Status:

Federal
FT Federally listed as threatened
– No federal status

State
CR California State listed as rare
– No state status

USFS
FSS USFS Sensitive
FSW USFS Watch List

California Rare Plant Rank (formerly known as CNPS Lists)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[3] All data from ENF (2016, 2017a), CNPS (2017), or Baldwin et al. (2012) unless otherwise noted.

[4] Information sources include Arora, D. 1986. Mushrooms demystified a comprehensive guide to the fleshy fungi. Second edition. Ten Speed Press, Berkeley, California; and USDA Forest Service and BLM (Bureau of Land Management). 2017. Interagency Special Status/Sensitive Species Program (ISSSSP). Website. https://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-fungi.shtml [Accessed September 20, 2017].

Appendix C

Sensitive Plant List for the Eldorado National Forest

Table C-1. Threatened, endangered, and sensitive plants known to occur or with suitable habitat on the ENF (May 3, 2016).

Species	Status[1]	On ENF[2]	Rationale for determination of no suitable habitat/no effect
Three-bracted onion (*Allium tribracteatum*)	S	P	Grows on open ridges with gravelly lahar soils (lava cap communities) in chaparral and lower & upper montane coniferous forests from ~ 3,300 to 10,000 feet in elevation.
El Dorado manzanita (*Arctostaphylos nissenana*)	S	K	Grows on highly acidic slate and shale soils and is often associated with closed-cone conifer forest from about 1,400 to 3,600 feet.
Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	S	P	Grows in chaparral, vernally moist meadows & grasslands, grasslands within oak woodland, and ponderosa pine forest below 4,600 feet.
Upswept moonwort (*Botrychium ascendens*)	S	P	Grows in lower montane coniferous forest, meadows, and seeps from 4,900 to over 7,500 feet in elevation.
Scalloped moonwort (*Botrychium crenulatum*)	S	K	Grows in fens, lower montane coniferous forest, meadows, seeps, and freshwater marshes from 4,900 feet to 10,500 feet in elevation.
Common moonwort (*Botrychium lunaria*)	S	P	Grows in meadows, seeps, subalpine and upper montane coniferous forest from 7,450 feet to over 11,000 feet in elevation.
Mingan moonwort (*Botrychium minganense*)	S	K	Grows in fens, lower and upper montane coniferous forest, meadows, and seeps from 4,900 to 6,750 feet.
Mountain moonwort (*Botrychium montanum*)	S	K	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Paradox moonwort (*Botrychium paradoxum*)	S	K	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Stalked moonwort (*Botrychium pendunculosum*)	S	P	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Bolander's bruchia (*Bruchia bolanderi*)	S	K	Grows in meadows and fens in montane and subalpine communities from about 5,500 to 9,000 feet. Grows in ephemeral habitats such as erosional ditches or small streamlets through wet meadows.
Pleasant Valley mariposa lily (*Calochortus clavatus* var. *avius*)	S	K	Grows in openings in mixed conifer & ponderosa pine forest, usually on ridgetops and south-facing slopes from 2,500 to 5,600 feet. There are numerous Occurrences along Weber Mill Road and 11N38G.

Species	Status[1]	On ENF[2]	Rationale for determination of no suitable habitat/no effect
Mountain lady's slipper (*Cypripedium montanum*)	S	P (K on inholding)	Grows in moist areas and upland sites with northerly aspects, loamy soils and shade, from 3,500 to 5,700 feet (generally <5,000 ft).
Branched collybia (*Dendrocollybia racemosa*)	S	K	Grows on remains of decayed mushrooms or occasionally in duff/leaf litter, in mid-mature to old-growth stands of mixed hardwood-conifer forests. Evidence of timber harvest at some extant occurrences.
Tahoe draba (*Draba asterophora* var. *asterophora*)	S	H	Restricted to rocky ledges and talus slopes in subalpine and alpine habitats above 8,200 feet.
Cup Lake draba (*Draba asterophora* var. *macrocarpa*)	S	K	Restricted to sandy slopes, rocky ledges, and talus slopes in subalpine and alpine habitats above 8,200 ft.
Tripod buckwheat (*Eriogonum tripodum*)	S	K	Grows on serpentine soils in foothill and cismontane woodlands below 5,300 feet.
Blandow's bog-moss (*Helodium blandowii*)	S	P	Grows in wet meadows, fens, & seeps in subalpine coniferous forest and alpine lakes from 6,100 to 9,000 feet.
Parry's horkelia (*Horkelia parryi*)	S	K	Grows on stony, disturbed, slightly acidic soils in open chaparral and cismontane woodland below 3,400 feet.
Hutchison's lewisia (*Lewisia kelloggii* subsp. *hutchisonii*)	S	K	Grows in openings in upper montane coniferous forest, often on slate soils and on soils that are sandy granitic to erosive volcanic from 4,800 to 7,000 feet.
Kellogg's lewisia (*Lewisia kelloggii* subsp. *kelloggii*)	S	K	Grows on granitic and volcanic balds from about 5,000 to 8,000 feet.
Long-petaled lewisia (*Lewisia longipetala*)	S	K	Restricted to subalpine & alpine slopes or basins with deep snow accumulations, above 8,200 feet.
Saw-toothed lewisia (*Lewisia serrata*)	S	K	Restricted to steep, nearly vertical cliffs in inner gorges of perennial streams and rarely near seeps and intermittent streams. Grows between 2,800 and 4,800 feet in the American River watershed.
Broad-nerved hump-moss (*Meesia uliginosa*)	S	P	Grows in permanently wet, primarily spring-fed meadows and fens in montane to subalpine coniferous forest from 4,200 to 9,200 feet.
Elongate Copper Moss (*Mielichhoferia elongata*)	S	P	Grows on metamorphic, sedimentary, limestone, and serpentine rock outcrops that often contain copper or other heavy metals and that are seasonally moist or less commonly on moist soil. Usually in foothill woodland habitats dominated by oaks or chaparral and sometimes with scattered incense cedar, Douglas-fir, and ponderosa pine. Grows from sea level to 3550 feet.

Species	**Status[1]**	**On ENF[2]**	**Rationale for determination of no suitable habitat/no effect**
Yellow-lip pansy monkeyflower (*Mimulus pulchellus*)	S	K	Habitat is vernally wet to moist sites which are open and flat or slightly sloping. Typically found on lava caps but soils can be clay, volcanic, or granitic. Grows from 2,200 to 6,400 feet.
Yellow bur navarretia (*Navarretia prolifera* subsp. *lutea*)	S	K	Grows in openings in or adjacent to mixed conifer forest or cismontane woodland on rocky ridgelines, saddles, or eroding ephemeral drainages from 2,300 to 5,000 feet.
Adder's tongue (*Ophioglossum pusillum*)	S	P	Grows in moist habitat including wet meadows and roadside ditches.
Layne's ragwort (*Packera layneae*)	T, S	K	Grows on rocky, gabbroic or serpentinitic soils in chaparral and cismontane woodland below 3,000 feet.
Veined water lichen (*Peltigera gowardii*)	S	K	Grows on rocks in cold, unpolluted spring-fed streams without marked seasonal fluctuation. Submerged most of year. Peak flows must not scour the rocks & gravels where this species attaches. Located on the ENF in 2008.
Stebbins' phacelia (*Phacelia stebbinsii*)	S	K	Grows on dry, open, rocky sites (bedrock outcrops, rubble or talus) on ledges or moderate to steep slopes and on damp, mossy inner gorges from 2,000 to 6,800 feet.
Olive phaeocollybia (*Phaeocollybia olivacea*)	S	P (K on inholding)	Conifer and hardwood forests where it grows in the humus layer. Logging disturbance, when present, is not intense (e.g., clear-cut or patch-cut).
Whitebark pine (*Pinus albicaulis*)	C, S	K	Whitebark pine typically occurs on cold and windy high elevation sites in western north America (7,000-12,000 feet).
Sierra blue grass (*Poa sierrae*)	S	K	Grows in lower montane coniferous forest on steep, shady, moist slopes from 1,200 feet to 3,800 feet.

[1] T =Federally Listed as Threatened; C = Federally Listed as Candidate; S = USFS Sensitive
[2] K = known to occur on ENF; P = suspected to occur on ENF; H = historic record on ENF

Appendix D

Watch List for Eldorado National Forest

Table D-1. Eldorado National Forest Watch List Species (January 26, 2017).

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Allium sanbornii var. *congdonii*	Congdon's onion	4.3	Serpentine outcrops	Traverse Creek	Up to 4,000	
Allium sanbornii var. *sanbornii*	Sanborn's onion	4.2	Serpentine outcrops	**Potential—**occurs on Tahoe NF	Up to 5,020	
Astragalus austiniae	Austin's milkvetch	1B.3	Alpine boulder & rock field in subalpine coniferous forest.	Along Shealor Lake trail	7,600	8,825
Astragalus whitneyi var. *lenophyllus*	Whitney's milk-vetch	4.3	Alpine boulder & rock field in subalpine coniferous forest.	Originally identified at Kirkwood Mountain Resort. Misidentified - no known occurrences on Forest.	Above 4,900	
Bolandra californica	Sierra bolandra	4.3	Rock crevices and wet cliffs along streams.	Alder Creek, Jaybird Canyon	3,100	4,200
Botrychium simplex	Yosemite moonwort	--	Moist and wet meadow, seeps, fens and streamside habitats about 6,000 feet in elevation.	Widespread	Above 5,000	
Calystegia vanzuukiae	Van Zuuk's morning glory	1B.3	Serpentine outcrops	Traverse Creek, Little Bald Mountain	1,640	3,900
Carex cyrtostachya	arching sedge	1B.2	Narrow endemic from the western slope of the northern Sierra Nevada of California	Traverse Creek, Blodgett, Kings Meadow near headwaters of Slab Creek	2,000	4,460

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Carex davyi	Davy's sedge	1B.3	Upper montane coniferous forest to Subalpine coniferous forest; Dry often sparse meadows or rocky areas.	Indian Valley?, Lake Winnemucca, Hermit Valley, Slippery Ford (1897 herbarium record)	Above 4,500	
Climacium dendroides	tree climacium moss	2B.1	Occurs in occasionally flooded mineral soil, especially on lake and river margins	Soldier Creek	Above ~3,500 (limited information available)	
Ceanothus fresnensis	Fresno ceanothus	4.3	Cismontane woodland (openings), lower montane coniferous forest	Chaix Mountain, Telephone Ridge, Bunker Hill	3,650	6,900
Chaenactis douglasii var. *alpina*	alpine dusty maindens	2B.3	Alpine boulder and rock field (granitic), Rocky or gravelly ridges, talus, fell-fields, crevices	Kirkwood Mountain Resort, Round Top, Carson Pass area	Above 9,800	
Chlorogalum grandiflorum	red hills soapwort	1B.2	Serpentine outcrops, open shrubby or wooded hills; Chaparral, Foothill Woodland, Yellow Pine Forest	Widespread – western Georgetown District	Up to 3,150	

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	4.2	Foothill woodland, chaparral, cismontane woodland, lower montane coniferous forest. Often found growing in road cuts	Slab Creek Reservoir and Ralston Ridge	Up to 3,000	
Clarkia virgata	Sierra clarkia	4.3	Foothill woodland, cismontane woodland, lower montane coniferous forest, yellow pine forest	Nevada Point Ridge; Herbarium records from Forebay Rd, Sugarloaf, Riverton, Plum Creek Ridge,	2,460 to 5,675	
Claytonia megarhiza	fell-fields claytonia	2B.3	Subalpine, alpine gravel, talus, crevices, growing In crevices between rocks in rocky or gravelly soils.	**Potential**- Dick's Peak in Desolation Wilderness	Above 8,500	
Corallorhiza trifida	northern coralroot; early coralroot	2B.1	Wet, open to shaded, generally coniferous forest. In California, under firs, in partial shade	**Potential**- CNDDB records from Plumas County. One report from Lake Tahoe region.	4,500	5,600
Drosera anglica	English sundew	2B.3	Fens, meadows and seeps often with Sphagnum	**Potential**- Sagehen Creek Field Station, Tahoe National Forest	4,250	6,500
Drosera rotundifolia	round leaf sundew	--	Fens, meadows and seeps often with Sphagnum	Widespread	Up to 8,900	

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Dryopteris filix-mas	male fern	2B.3	Upper montane coniferous forest (granitic, rocky); Granitic cliffs	Historic herbarium record from Cole Creek Road	Above 7,800	
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	4.3	Cismontane woodland, serpentine or Ione Formation soils	SMUD transmission line/Iowa Hill area on Placerville RD	1,000	2,000
Jensia yosemitana	Yosemite tarweed	3.2	Spring-wet, sunny, sandy places, meadows	Bassi Falls	4000	7500
Mimulus laciniatus	cutleaf monkey flower	4.3	Growing on decomposed granite in moist sandy places.	Salt Springs Reservoir, Cole Creek Diversion	Above 3,100	
Myrica hartwegii	Sierra sweet bay	4.3	streambanks and other moist places in foothill and low montane forest	Big Grizzly Canyon, Stumpy Meadows, Alder Creek, Camp Creek	Up to 6,000	
Orthotrichum holzingeri	Holzinger's orthotrichum moss	1B.3	Usually on rock in and along streams, rarely on tree limbs	North shore of Salt Springs Reservoir	2,345	6,000
Perideridia bacigalupii	Mother Lode Yampah	4.2	Sites in which it occurs include open rocky areas, chaparral openings, slopes, and road cuts. Usually on serpentine	**Potential**- Historic Stebbins's collection from Rescue	Up to 3,500	
Piperia colemanii	Coleman's Rein Orchid	4.3	Open conifer forest, scrub; often in sandy soils.	Nevada Point Ridge, Gerle Creek, Loon Lake Rd, Bassi Creek	3,900	7,545

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Piperia leptopetala	petaled rein orchid	4.3	Generally dry sites, scrub, woodland; Chaparral, Foothill Woodland, Yellow Pine Forest, Red Fir Forest.	Big Meadow Campground and Hell Hole Reservoir	1,100	7,300
Pseudostellaria sierrae	Sierra Starwort	4.2	Meadows, dry understory of mixed oak or conifer forest	Junction Reservoir	4,000	7,200
Rhynchospora alba	white beaked-rush	2B.2	Wet meadows, fens, seeps, and marshes	**Potential**- on Plumas and Lassen NF and historic occurrence from Yosemite Valley	Up to 6,700	
Rhynchospora capitellata	brownish beakrush	2B.2	Wet meadows, fens, seeps, and marshes	Kings Meadow according to Laurence Janeway (2007)	Up to 6,560	
Sambucus nigra subsp. *caerulea*	blue elderberry	--	Riparian areas; of concern below 3,000' as host plant for Threatened Valley Elderberry Longhorn Beetle	Widespread	Up to 3,200	
Sparganium natans	small bur reed	4.3	Wetland-riparian, lake margins.	Lower Blue Lakes	2,800	8,560
Streptanthus longisiliquus	long-fruit jewelflower	4.3	Mixed-conifer forest	Peavine/Telegraph/Jay bird Ridges on Pacific RD	2,500	5,000

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Taxus brevifolia	Pacific yew	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest, Red Fir Forest	Widespread- Eldorado NF is near the southern edge of the species range	Up to 4,600	
Torreya californica	California nutmeg	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest	Widespread	Up to 3,000	
Viburnum ellipticum	oval-leaved viburnum	2B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Chaparral, yellow-pine forest, generally n-facing slopes	**Potential**-City of Placerville, Lake Clementine, Forest Hill Road	Up to 4,500	
Wyethia reticulata	El Dorado County mule ears	1B.2	Stony red clay and gabbroic soils; often in openings in gabbro chaparral	**Potential**- Cameron Park/Pine Hill	Up to 2,060	

Appendix E

Invasive Plant List for the Eldorado National Forest

Table E-1. Invasive Plant List for the Eldorado National Forest (November 8, 2016).

Group 1 (Eradicate): Highly invasive species known to occur on the Eldorado National Forest. Species are uncommon and are a priority for inventory, control, and eradication.

Acroptilon repens Russian knapweed
Aegilops triuncialis barbed goatgrass
Ailanthus altissima Chinese tree of heaven
Arundo donax Arundo
Centaurea calcitrapa purple starthistle
Centaurea diffusa diffuse (white) knapweed
Centaurea stoebe spotted knapweed
Cirsium arvense Canada thistle
Euphorbia oblongata oblong spurge
Isatis tinctoria dyer's woad
Lepidium latifolium tall whitetop
Lythrum salicaria purple loosestrife
Sorghum halepense Johnson grass

Group 2 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory all infestations. Annually treat a portion of known infestations, focusing first on eradicating/containing isolated outlying infestations and, over time, reducing the footprint of larger, less isolated infestations.

Carduus pycnocephalus Italian thistle
Centaurea melitensis tocalote
Centaurea solstitialis yellow starthistle
Chondrilla juncea rush skeleton weed
Cytisus scoparius Scotch broom
Elymus caput-medusae medusahead
Foeniculum vulgare Fennel
Genista monspessulana French broom
Spartium junceum Spanish broom

Group 3 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory and treat isolated leading edge infestations or where concurrent with higher priority infestations.

Brassica nigra black mustard
Bromus tectorum cheat grass
Chenopodium botrys Jerusalem-oak goosefoot
Cirsium vulgare bull thistle
Hedera helix English Ivy
Hypericum perforatum Klamath weed
Lathyrus latifolius perennial sweet pea
Leucanthemum vulgare Oxeye daisy
Melilotus alba white sweet clover
Melilotus officinalis yellow sweet clover
Rubus armeniacus Himalayan blackberry
Rubus lacineatus cut leaf blackberry
Salsola tragus Russian thistle/tumbleweed
Silybum marianum milk thistle
Torilis arvensis hedge parsley
Tribulus terrestris puncture vine
Vinca major periwinkle

Group 4 (Manage through education and prevention): Species are well established across forest or have minor economic or ecological impacts. Forest will use appropriate prevention and education measures to limit further spread.

Bromus diandrus ripgut brome
Bromus madritensis var. *rubens* red brome
Conium maculatum poison hemlock
Cynodon dactylon Bermuda grass
Cynosurus echinatus spiny dogtail
Dactylis glomerata Orchard grass
Festuca arundinacea tall fescue
Hirschfeldia incana mustard
Lychnis coronaria rose campion/ mullein pink
Sisymbrium altissimum Jim Hill mustard
Verbascum thapsus mullein

<u>Potential invasives:</u> Species not yet found on the Eldorado National Forest. If found, infestations should be inventoried and targeted for eradication or control.

Aegilops cylindrica Jointed goatgrass
Cardaria chalepensis small whitetop
Cardaria draba hoarycress
Cardaria pubescens whitetop
Carduus nutans musk thistle
Carthamus lanatus Woolly distaff thistle
Centaurea pratensis meadow knapweed
Centaurea sulphurea Sicilian starthistle
Cortaderia selloana pampas grass
Dittrichia graveolens stinkwort
Euphorbia esula leafy spurge
Linaria genistifolia subsp. *dalmatica* dalmatian toadflax
Linaria vulgaris yellow toadflax
Nicotiana glauca Tree tobacco
Onopordum acanthium Scotch thistle
Phragmites australis common reed
Phytolacca amaericana Pokeweed
Polygonum cuspidatum Japanese knotweed
Polygonum sachalinense Sakhalin knotweed
Potentilla recta Sulfur cinquefoil
Sesbania punicea Scarlet wisteria
Tamarix chinensis Salt Cedar
Tanacetum vulgare tansy
Ulex europaeus Gorse

Appendix H
Pesticide Spill Prevention, Control and Countermeasure Plan for the Upper American River Project
Vegetation and Invasive Weed Management Plan

APPENDIX H

PESTICIDE SPILL PREVENTION, CONTROL, AND COUNTER- MEASURE PLAN

I. Introduction

This Plan is prepared as a best management practice for the integrated vegetation management plan proposed by the Sacramento Municipal Utility District (SMUD) to apply herbicide within the right-of-way (ROW) of the transmission lines, along roads, and surrounding hydroelectric facilities on the Eldorado National Forest.

This Plan outlines the procedures to be used for spill prevention and in response to an accidental spill of pesticides, should one occur, during the transportation, handling, mixing, and application.

II. Spill Response - General

The senior ranking employee at the site will take charge and arrange the following:

- Take necessary action to protect employees, the public and the environment.
- Communicate the situation and seek help, if needed.

III. Actions to Take

- Assess the extent of the spill for reporting.
- Notify Eldorado National Forest Dispatch at (530) 644-2349.
- Immediately take measures to contain and isolate the spill to prevent it from spreading.
- Initiate clean-up activities in accordance with established procedures.
- Bring in additional personnel, if required.

IV. Manufacturer's Spill Clean-up Specifications

Herbicides (active ingredient and preferred formulation) proposed for use in the plan are listed in Table 5-1. Formulation is the commercial or registrant's brand name and label.

The registrants' specifications for a spill of any one of the products listed in Table 5-1 include the following:

- Soak-up the spill using absorbent material such as sand.
- Remove contaminated material and soil to an approved land-fill.

Product Specific emergency response and containment information is included on each formulated product Material Safety data sheet (MSDS).

V. Specific Prevention and Spill Action Measures

- Identify the highest spill potential risk areas (i.e., transportation, mixing, and handling of herbicides).
- MSDSs for each product shall be carried in the vehicle(s) transporting herbicides and also at the job site.
- A licensed Qualified Applicator(s) shall be responsible for all phases of herbicide operations from storage, transportation, mixing, handling, and application.
- All personnel associated with herbicide operations shall be trained annually in the application, spill prevention, and clean-up procedures.
- Required personal protective equipment (PPE) shall be used during all phases of herbicide operations.
- Spill containment materials shall be available during all phases of herbicide operations, including: hand tools, absorbent materials, and plastic bags for cleanup and disposal of contaminated soil. This would include a 5 gallon re-sealable over pack with sufficient containment equipment.
- Herbicide concentrate shall be stored in a locked facility during non-use periods. Tank-mixed herbicides will have an identification tag and the container will have a locked cap.
- Herbicides will be transported in small containers (i.e., 2.5 gallons) within protective boxes and in small volumes (a maximum of 20-30 gallons).
- Direct radio/telephone communications links to Steve Hallmark, SMUD Vegetation Manager, will be established to initiate the Notification Process. The following are the communication links:
    - Steve Hallmark: cell (916) 600-7576, office (916) 732-6251, or Phil Bien: cell (916) 801-2312, office (530)644-2013.
    - Contact information will be updated prior to implementation each year during the agency review period.

Appendix I
2022 Biological Evaluation/Assessment for Botanical Resources in the Pine Hills Preserve

Biological Evaluation/ Biological Assessment for Botanical Resources

Sacramento Municipal Utility District

Plan to use Herbicides for Vegetation Management within SMUD's Transmission ROW at Pine Hill Preserve • February 2022

Upper American River Project

FERC Project No. 2101

Powering forward. Together.

SMUD®

This Page Intentionally Left Blank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Acronyms and Abbreviations

Acronym	Definition
BA	Biological Assessment
BE	Biological Evaluation
BLM	Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
CAL DPR	California Department of Pesticide Regulation
Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
ENF	Eldorado National Forest
FERC	Federal Energy Regulatory Commission
IPaC	Information for Planning and Consultation
IVM	Integrated Vegetation Management
kV	kilovolt
MPH	miles per hour
NOAA	National Oceanic and Atmospheric Administration
PCA	Pest Control Advisor
PCO	Pest Control Operator
Preserve	Pine Hill Preserve
PSI	pounds per square inch
QAC	Qualified Applicator’s Certificate
QAL	Qualified Applicator’s License
RCA	Riparian Conservation Area
ROW	right of way
SMUD	Sacramento Municipal Utility District
UARP	Upper American River Project
USFS	U.S. Department of Agriculture, Forest Service
USFWS	United States Fish and Wildlife Service
VIWMP	Vegetation and Invasive Weed Management Plan

This Page Intentionally Left Blank

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this botanical Biological Evaluation (BE)/Biological Assessment (BA) is to evaluate potential effects (direct and indirect) to special-status plants as a result of amending the Vegetation and Invasive Weed Management Plan (VIWMP) (Appendix A) for the Sacramento Municipal Utility District's (SMUD's) Upper American River Project (UARP) to include the option of using herbicides within Pine Hill Preserve (Preserve).

1.2 PROJECT AREA

The Project Area addressed by this BE/BA is defined as the UARP Federal Energy Regulatory Commission (FERC) boundary limited to Bureau of Land Management (BLM) lands in the Preserve (Figure 1-1). The Project Area encompasses SMUD's 230 kilovolt (kV) White Rock-Orangevale transmission line right of way (ROW) through the Penny Lane Unit of the Preserve.

2.0 CONSULTATION TO DATE

The Biological Opinion (BO) on the Issuance of a New License for the Upper American River Hydroelectric Project (USFWS 2009) addressed the effects of proposed vegetation management on the federally endangered Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron decumbens*), and the federally threatened Layne's ragwort (*Packera layneae*). To date, SMUD has adopted the conservation measures in the BO related to these species when conducting transmission line maintenance activities in the Project Area by consulting with BLM, the United States Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW) (Conservation Measure 3); identifying species' occurrences at the site prior to the onset of activities (Conservation Measure 1); and developing the VIWMP, which was developed in consultation with and approved by agencies as described in FERC License Article 401a (Conservation Measure 5). Conservation Measure 6 in the BO and the UARP FERC License require potential impacts to federally listed species from individual projects within the FERC boundary to be analyzed within the framework of a BA. As such, when SMUD prepared the VIWMP for the UARP, as directed by Conservation Measure 5 in the BO, a BE/BA was also prepared to analyze the potential impacts of implementing the VIWMP on federally listed species. At that time, the VIWMP restricted vegetation treatment within the Project Area to manual methods only because of the potential concentration of federally listed plants. Manual methods are no longer sufficient to efficiently and safely manage the vegetation within the transmission line ROW (see Section 3 below), so SMUD is planning to revise the VIWMP to allow herbicide usage within the Project Area.

On January 28, 2021, SMUD participated in the Pine Hill Preserve Cooperative Management Agreement meeting hosted by Graciela Hinshaw, the Preserve Manager for BLM, and attended by staff from USFWS, CDFW, and other interested parties. At this meeting SMUD initially proposed the selective use of herbicides to control undesirable vegetation within the Project Area. The BLM, including Preserve Manager Graciela Hinshaw, were amenable to the concept if provided additional information, including analysis of potential effects to federally listed and BLM Sensitive plant species. Continued coordination with Rick Kuyper of the USFWS confirmed that SMUD (acting as federal lead agency on behalf of FERC as directed by the FERC License) could prepare a BA analyzing potential effects to federally listed species for formal consultation with the USFWS.

Further informal consultations were held with the BLM, including a field visit to the site on March 9, 2021, where BLM staff were able to view the current condition, hear how SMUD planned to manage the site using herbicides, and voice their concerns. The BLM has continued to be involved throughout the development of the BE/BA to confirm special-status and invasive plant species that should be addressed and herbicides that are approved on BLM lands. The BLM has an interest in the use of herbicides in other locations within the Preserve to fight growing infestations of invasive species.

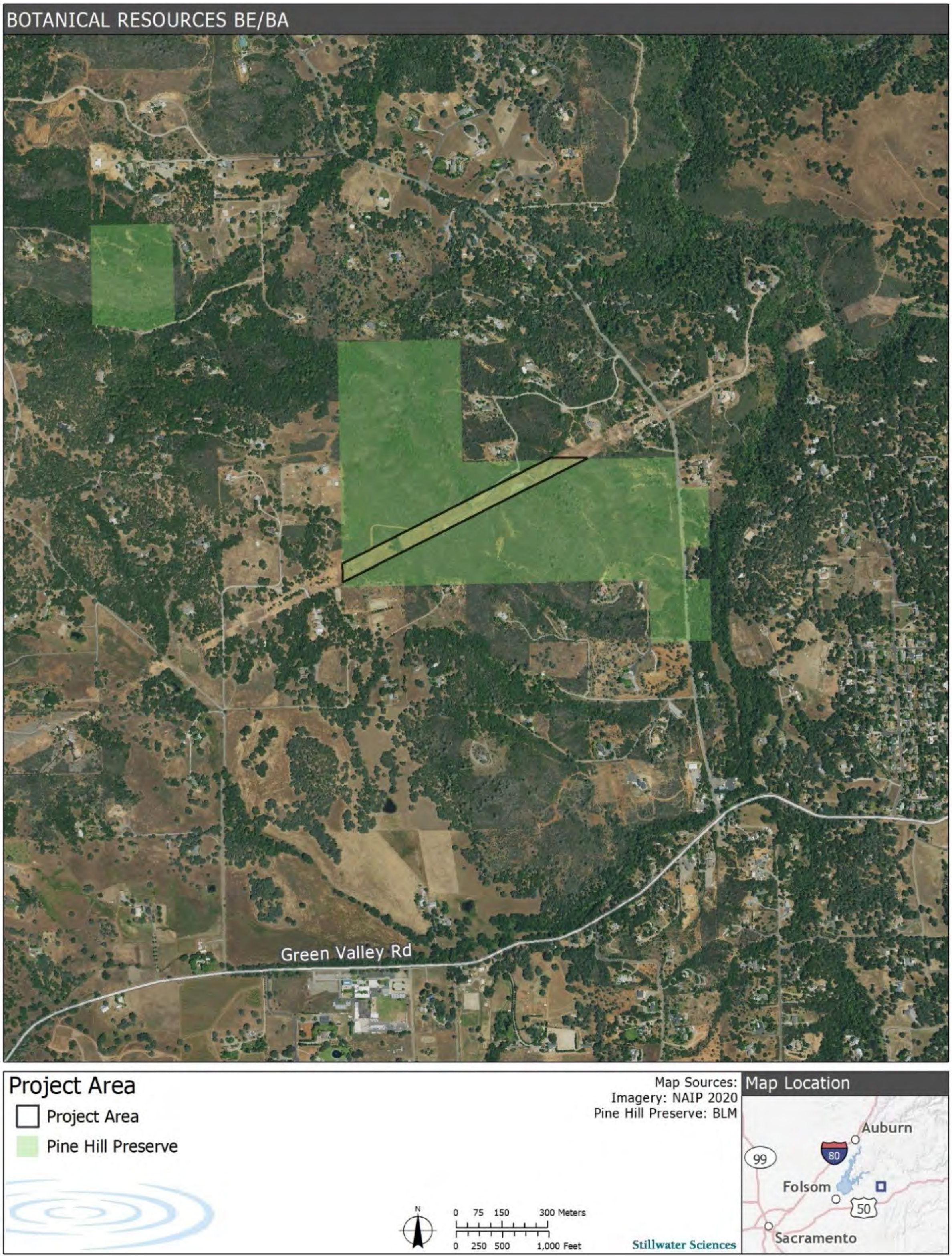


Figure 1-1. Botanical Resources Biological Evaluation/Biological Assessment Project Area.

3.0 NEED FOR ACTION

SMUD is responsible for maintenance of the 230 kV White Rock-Orangevale overhead transmission line ROW within the Project Area. Because of the transmission line's age, customer demographic, surrounding environment, accessibility, and historical operations, it is ranked as a priority 1 system that is most critical for the continued performance of California's transmission grid. Several federal and state laws describe the vegetation clearance and maintenance requirements for this transmission line, including FERC License Articles 20, 27, and 33; FERC Safety Inspection Chapter 5; California Public Resource Code 4292 and 4293; and California Public Utilities Commission General Order 95.

Past vegetation management in the Project Area has relied on pruning trees and masticating brush within the ROW corridor, in addition to the removal of select hazard trees. These methods have been inadequate to maintain densely growing chaparral shrub and conifer species in accordance with federal and state requirements such that the vegetation threatens to reduce the reliability of the transmission line. Herbicide usage would promote a change of vegetation structure within the ROW to low-growing plant species with a reduced likelihood of interference with the transmission line, which would maintain a high standard of system reliability and reduce the potential for a catastrophic fire initiated by vegetation contact with the transmission line. A more intensive vegetation monitoring and maintenance program within the ROW would be consistent with SMUD's initiatives to be proactive in reducing the risk of accidental wildfire ignition as the wildfire threat in California continues to become increasingly severe. The use of herbicides would also allow SMUD to more effectively control invasive weed species that could encroach into cleared areas like the ROW following intensive vegetation management.

4.0 PROPOSED ACTION

The Proposed Action includes use of several herbicides for vegetation management within the Project Area in addition to the manual vegetation treatment methods currently allowed per the VIWMP (Table 4-1). Multiple application methods may be employed, depending on the herbicide formulation, vegetation type, and period of implementation (i.e., initial or follow-up treatment). Each of these herbicides and application methods are already approved for use within the remainder of the UARP, excluding designated wilderness areas, and are described in detail Section 2.3.1 of the VIWMP (Appendix A). Herbicide application within the Project Area would adhere to Best Management Practices (BMPs) (Section 5.2), invasive weed prevention and botanical resource protection measures (Section 5.4), application requirements (e.g., personnel training, application oversight, annual inspections) (Section 2.3), and transmission line ROW management strategies (Section 2.4.1) which are also described in detail in the aforementioned sections of the VIWMP (Appendix A).

Table 4-1. Herbicides, Application Methods, and Adjuvants Proposed for Use in the Project Area.

Herbicide	Application method	Adjuvants[1]	Application type	Maximum application rate	Optimal timing	Primary purpose
Aminopyralid	Targeted backpack	Surfactant (Competitor), colorant (Hi-light Blue)	Selective post-emergent with pre-emergent activity	0.11 a.e. lbs/acre	Late winter, fall	Broadleaf invasive plant control
Chlorsulfuron	Targeted backpack/selective pre-emergent	Surfactant (Competitor), colorant (Hi-light Blue)	Selective pre-emergent	0.05 ai lbs/acre	Late winter	Broadleaf selective
Clopyralid	Targeted backpack	Surfactant (Competitor), colorant (Hi-Light Blue)	Selective post-emergent	0.14 a.e. lbs/acre	Spring	Broadleaf invasive plant control
Glyphosate (non-surfactant formula)	Targeted backpack, cut stump, frill, wicking	Surfactant (Competitor), colorant (Hi-Light Blue)	Non-selective post-emergent	2.0 a.e. lbs/acre	Late winter through late fall	General vegetation management
Imazapyr (aquatic)	Targeted backpack, cut stump, frill, wicking	Surfactant (Competitor), colorant (Hi-Light/Blazon Blue)	Non-selective post-emergent	0.33 a.e. lbs/acre	Late summer through fall	Brush control
Imazapyr (terrestrial)	Basal stem	Diluent (Competitor), no colorant	Non-selective post-emergent	0.33 a.e. lbs/acre	Late summer through fall	Brush control
Sulfometuron methyl	Targeted backpack/ pre-emergent	Surfactant (Competitor), colorant (Hi-light/Blazon Blue)	Non-selective pre-emergent	0.14 ai lbs/acre	Late winter	Grass selective
Triclopyr (choline formulation)[2]	Targeted backpack, cut stump, frill	Surfactant (Competitor), colorant (Hi-Light/Blazon Blue)	Selective post-emergent; tank mixed with glyphosate or aminopyralid for broader spectrum	2.0 a.e. lbs/acre	Late winter through early fall	Weed and woody vegetation control
Triclopyr (ester formulation)	Cut stump, frill, basal stem	Diluent (Competitor), no colorant	Selective post-emergent	2.0 a.e. lbs/acre	Fall	Woody vegetation control

Notes: a.e. = acid equivalent, ai = active ingredient, lb = pound

[1] Adjuvants include dyes, stickers and spreaders that aid in the detection and efficacy of sprays. Any surfactants that are used will be considered safe to use around insects and other sensitive plants and wildlife.

[2] The choline formulation of triclopyr was not included in the Vegetation and Invasive Weed Management Plan (VIWMP) but has reduced toxicity, volatility, and odor relative to other formulations included in the VIWMP.

5.0 CURRENT MANAGEMENT DIRECTION

The Preserve was established in 2001 to protect the habitat of eight rare plant species[1] found on the unique gabbro soils of western El Dorado County (Hinshaw 2008). A Cooperative Management Agreement among local, state, and federal agencies, and private landowners guides management actions within the Preserve to enable continued protection of these rare plant species. Management strategies are developed and implemented to be consistent with several objectives, including the institution of a vegetation management program "to promote the viability of the rare plant species at the Preserve, reduce the threat of wildfire, and increase the protection of properties and structures adjacent to the Preserve."

Management of the Preserve also falls under the Sierra Resource Management Plan which recommends the use of multiple vegetation treatment methods, including herbicides, to control invasive species and promote healthy and diverse vegetation communities (BLM 2007).

5.1 BOTANICAL RESOURCES PROTECTION MEASURES

In order to avoid adverse effects on botanical resources, including special-status plant species, SMUD implements the following protection measures in the Project Area, as outlined in Section 5.4 of the VIWMP (Appendix A):

- **PM-8:** Surveys for special-status plant and invasive weed populations will be completed every five years and communicated to SMUD vegetation managers and agency stakeholders.
- **PM-9:** SMUD will consult annually with the ENF [Eldorado National Forest] and BLM to review the most current list of special-status plant species and invasive weeds that might occur on National Forest System or BLM lands in the [Upper American River] Project Area directly affected by [Upper American River] Project operations. If any previously unidentified occurrences are noted, then SMUD would manage them according to the provisions in this plan [VIWMP].
- **PM-11:** Prior to herbicide treatments or mechanical treatments, SMUD will flag occurrences of ENF/BLM Sensitive plant species.
- **PM-12:** SMUD will invite a USFS [U.S. Department of Agriculture, Forest Service] and/or BLM botanist to visit sites where treatment has occurred near special-status plants to see if resource protection measures were effective.

---

[1] The rare plant species targeted for protection within Pine Hill Preserve include Stebbins' morning-glory (*Calystegia stebbinsii*), Pine Hill ceanothus, El Dorado bedstraw (*Galium californicum* subsp. *sierrae*), Pine Hill flannelbush, Layne's ragwort, Red Hills soaproot (*Chlorogalum grandiflorum*), Bisbee Peak rush-rose (*Crocanthemum suffrutescens*), and El Dorado County mule ears (*Wyethia reticulata*).

PM-14, which restricted vegetation treatment within the Preserve to manual methods, will be replaced with new provisions applicable to the Proposed Action. The updated measure is outlined in Section 7.1, *Herbicide Application Effects*.

5.2 INVASIVE WEED PREVENTION PROTECTION MEASURES

Invasive weeds are not currently widespread within the Project Area, but regular monitoring and follow-up treatment are required to inhibit their spread. SMUD adheres to the following specific protection measures outlined in Section 5.4 of the VIWMP (Appendix A) to control invasive weeds within the Project Area:

- **PM-15:** Annual effectiveness monitoring (see Section 3.2 [of the VIWMP]) will include monitoring of invasive weed infestations that are targeted for control or eradication. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments are needed. Where past treatments have successfully controlled or eradicated an infestation SMUD will continue to monitor the infestation annually until it is determined that treatment objectives have been met (based on expected seed bank longevity of the targeted species).
- **PM-16:** New populations of invasive weeds will be inventoried and mapped during regularly described monitoring, and will be subsequently incorporated into the scheduled annual treatment.
- **PM-17:** Control methods will be determined by species, location, and season to facilitate the control of invasive/noxious weeds, as part of the annual maintenance work.
- **PM-18:** Management of invasive weeds will follow the management guidelines identified by the ENF and other stakeholders.
- **PM-19:** IVM [Integrated Vegetation Management] activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance or removal of shade and native vegetation or topsoil.
- **PM-20:** Equipment, Staff, and Contractors involved in IVM shall be staged and begun in non-infested areas and then will move to infested areas.
- **PM-21:** Contractors and other staff will be required to clean vehicles and equipment prior to working on the National Forest; when moving from an infested unit to a weed-free unit, vehicles and equipment will be inspected. Vehicles will be washed by contractor at their business or at SMUD's Fresh Pond facility.
- **PM-22:** Areas in which ground-disturbing activity has occurred[2], and in which there is the potential to introduce invasive weeds, will be monitored for 3 years.

[2] Not likely to be needed unless a tower has to be replaced in the future.

- **PM-23:** Weed-free materials, including certified weed-free straw or mulch, will be used wherever possible for erosion control, as these materials are available, with the county of origin stating the material was inspected. Local stockpiles and materials will be kept weed free with regular treatment.
- **PM-24:** Lay-down and staging areas will be designated outside of areas infested with weeds, or the sites will be treated prior to work.
- **PM-25:** Facility sites will be maintained to limit the introduction and spread of invasive plants; heavily used facilities will be regularly treated to prevent the spread of weeds.
- **PM-26:** Mechanical weed trimming will not be used to manage occurrences of listed invasive weeds if those weeds have already set seeds.

5.3 WATER QUALITY BEST MANAGEMENT PRACTICES

The following water quality BMPs outlined in Section 5.2 of the VIWMP (Appendix A) will ensure the potential for adverse impacts from herbicide application will be minimized or avoided:

- **BMP-4:** Annual employee awareness training (See Section 5.1 [of the VIWMP]) shall be implemented to ensure that all personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources and invasive species considerations.
- **BMP-5:** SMUD IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance, as well as removal of shade and native vegetation or topsoil.
- **BMP-14:** SMUD PCOs [Pest Control Operators] will apply chemical treatments according to label directions, prescriptions, and all applicable laws and regulations governing the use of pesticides; pesticide label requirements will be followed. A licensed Pest Control Advisor (PCA) will be consulted in the planning and execution of all herbicide applications. Individuals with a Qualified Applicator's License or Certificate (QAL or QAC) from the California Department of Pesticide Regulation (CAL DPR) will oversee applications on the ground.
- **BMP-15:** When using herbicides, SMUD PCOs will use the most specifically targeted application method that can effectively achieve program goals.
- **BMP-16:** SMUD will implement the Pesticide Spill Contingency Plan (see Appendix H [of the VIWMP] to reduce contamination of water by accidental pesticide spills.
- **BMP-17:** PCOs will follow safe procedures for transporting, mixing, and loading herbicides by instituting the following measures:

- PCOs will limit the amount of herbicide that is transported in a vehicle to that which could be batched and used in a single day. Typically, that would be no more than enough to create 200 gallons of final mix, which will be mixed in batches as needed, not all at once. PCOs will transport herbicides in a spill-proof, non-food container if they are not using the original container.
- PCOs will mix and load herbicides only in pre-designated areas, outside of [riparian conservation areas] RCAs [Riparian Conservation Areas]. They will select areas where a potential spill would be most easy to contain and would have the least impact.
- PCOs will add a marker dye to the herbicide mixture so workers can readily see any spills. Dye also helps workers see any drift or misapplication to non-target plants, and it helps them monitor where they have sprayed previously.
- PCOs will carry a spill kit to contain and remove any spills immediately and will train crews on procedures for doing so.
- PCOs will carry soap and water to wash spills off hands, feet and legs, and bring extra gloves.
- PCOs will triple rinse emptied herbicide containers into the sprayer at the time of use and utilize these spray rinses in areas allowed by the herbicide label.

- **BMP-18:** PCAs will consider the effective timing of the herbicide and application technique to be used based on its “mode of action” and the target plant’s annual growth cycle. Efficacy, efficiency, and environmental constraints will dictate treatments. The most effective treatments result in the least amount of entries. Anything above 85% control is considered commercially acceptable.
- **BMP-20:** Measures to control pesticide drift during spray application will include, but are not limited to:
  - Using ground-based application equipment,
  - Using spray nozzle that produces 350 micron or greater droplets,
  - Using nozzle pressures below 25 PSI [pounds per square inch] on backpacks,
  - Using spray nozzles no higher than 2 feet from the ground, and
  - Using ground application directed away from non-target vegetation.

  Drift reduction nozzles may be employed where warranted.
- **BMP-22:** A licensed PCA will prepare the Pesticide Use Recommendations based on site-specific conditions, including soils, slopes, and vegetation composition.
- **BMP-23:** PCA herbicide applications will comply with product label directions and applicable legal requirements. Herbicide applications will treat the minimum area necessary to meet site objectives.

- **BMP-24:** PCOs will conduct as few treatments as possible, since the act of entering the area to be treated may itself have the most significant potential for impacts to wildlife. Treating an area once with an herbicide with a slightly higher potential for impact may have less overall impact than multiple applications with a lower-impact herbicide.

6.0 EXISTING ENVIRONMENT

6.1 ENVIRONMENTAL BASELINE

The Preserve is located within the Northern Sierra Nevada Foothills Subregion of the California Floristic Province (Jepson Flora Project 2021) and is situated on a unique gabrro rock formation. The gabbroic soils are sandy and well-drained, have a high iron and magnesium content, and host a high diversity of vascular plant species, including several rare and endemic species (Hinshaw 2008).

The predominant habitat type in the Project Area is northern mixed chaparral, which is dominated by shrubs including sticky whiteleaf manzanita (*Arctostaphylos viscida*), western redbud (*Cercis occidentalis*), Lemmon's ceanothus (*Ceanothus lemmonii*), and chamise (*Adenostoma fasciculatum*) with an herbaceous understory that includes Sonoma sage (*Salvia sonomensis*) and El Dorado County mule ears (*Wyethia reticulata*).

In 2020, densely growing chaparral shrubs in the Project Area were cleared via mechanical methods to ensure continued reliability of the transmission line. Special-status plants were mapped, flagged, and protected prior to any vegetation removal. As such, the Project Area is currently clear of tall trees and shrubs; however, many tree and shrub species have regenerated in the year following vegetation treatment.

6.2 SPECIAL-STATUS PLANTS

Special-status plant species are defined as those that are (1) listed, proposed for listing, or candidate for listing as threatened or endangered under the federal Endangered Species Act; (2) listed on the BLM Sensitive plant list for the Mother Lode field office; (3) proposed for listing, or under review as rare, threatened, or endangered under the California Endangered Species Act; and/or (4) included on CDFW's most recent Special Vascular Plants, Bryophytes, and Lichens List with a California Rare Plant Rank (CRPR) of 1B, 2B, 3, or 4.

Appendix B includes a list of special-status plant species with the potential to occur in the Project Area based on habitat conditions (e.g., soils, habitat type, elevation, and distributional range). The list was developed by querying the following resources:

- The USFWS Information for Planning and Consultation (IPaC) portal (USFWS 2021),

- The California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2021),
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2021), and
- The most current BLM Sensitive plant list for the Mother Lode Field Office (BLM 2015).

The USFWS IPaC query was based on the spatial extent of the Project Area. The CNPS and CNDDB database queries were each based on a search of the Project vicinity, which is defined as the USGS 7.5-minute quadrangle in which the Project Area is located (Shingle Springs) and the surrounding quadrangles (Pilot Hill, Coloma, Garden Valley, Placerville, Fiddletown, Latrobe, Folsom SE, and Clarksville). Appendix B lists all special-status plant species identified from the USFWS, CNPS, CNDDB, and BLM queries.

Information was compiled on known occurrences of special-status plant species documented in and near the Project Area, including CNDDB spatial data and results of comprehensive floristic surveys conducted in 2016, 2020, and 2021 (Atkins 2016, Stillwater Sciences 2020, Stillwater Sciences 2021). Table 6-1 summarizes the two federally listed, two BLM Sensitive, and one state listed plant species with the potential to be impacted by the Proposed Action. The subsequent sections provide location information for the special-status plant species documented in or near the Project Area.

Table 6-1. Special-Status Species with the Potential to Be Impacted by the Proposed Action.

Scientific name	Common name	Status[1] Federal/State/ BLM/CRPR	Blooming period	Elevation range (feet)	Lifeform	Habitat associations	Location information within the Project Area
Federally Listed Species							
Galium californicum ssp. *sierrae*	El Dorado bedstraw	FE/CR/ BLMS/1B.2	May–Jun	330–1,920	perennial herb	Gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest	Occurrence adjacent to northern border and downhill of Project Area (Burge and Eldredge 2020)
Packera layneae	Layne's ragwort	FT/CR/ BLMS/1B.2	Apr–Aug	655–3,560	perennial herb	Serpentinite or gabbroic, rocky areas in chaparral and cismontane woodland	Several occurrences in the Project Area, primarily in open or disturbed sites (Stillwater Sciences 2021)
BLM Sensitive Species							
Chlorogalum grandiflorum	Red Hills soaproot	–/–/ BLMS/1B.2	May–Jun	805–5,545	perennial bulbiferous herb	Serpentinite, gabbroic, and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Historical occurrence from 1989 (CDFW 2021); not located in recent surveys (Stillwater Sciences 2021)
Wyethia reticulata	El Dorado County mule ears	–/–/ BLMS/1B.2	Apr–Aug	605–2,065	perennial herb	Clay or gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest	Occurrences throughout the Project Area, often in open areas or the understory of whiteleaf manzanita (Stillwater Sciences 2021)
State Listed Species							
Crocanthemum suffrutescens	Bisbee Peak rush-rose	–/–/–/3.2	Apr–Aug	245–2,200	perennial evergreen shrub	Often gabbroic or Ione soil, and burned or disturbed areas in chaparral	Two occurrences in the Project Area (Stillwater Sciences 2021)

[1] Status:

Federal

FE Federally listed as endangered
FT Federally listed as threatened
– No federal status

State

CR California State listed as rare
– No state status

Bureau of Land Management (BLM)

BLMS BLM Sensitive

California Rare Plant Rank

1B Plants rare, threatened, or endangered in California and elsewhere
3 Plants about which more information is needed

California Native Plant Society Threat Ranks:

0.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

6.2.1 Federally Listed Species

6.2.1.1 El Dorado bedstraw (*Galium californicum* subsp. *sierrae*)

El Dorado bedstraw (*Galium californicum* subsp*. sierrae*) is a perennial herb in the Rubiaceae family. It is federally endangered, California Rare, BLM Sensitive, and CRPR 1B.2. It occurs on gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest and blooms from May to June. It is threatened by development, vehicles, and recreational activities (CNPS 2021). One occurrence of El Dorado bedstraw adjacent to the northern border and downhill of the Project Area was documented in 2018 (Burge and Eldredge 2020).

6.2.1.2 Layne's ragwort (*Packera layneae*)

Layne's ragwort is a perennial herb in the Asteraceae family. It is federally threatened, California Rare, BLM Sensitive, and CRPR 1B.2. It occurs on serpentinite or gabbroic, rocky soils in chaparral and cismontane woodland and blooms from April to August. It is threatened by urbanization, development, clearing, grazing, road construction, vehicles, non-native plants, and fire suppression (CNPS 2021). Twelve occurrences of Layne's ragwort were documented in the Project Area, primarily in open and/or disturbed areas, during comprehensive botanical surveys in 2021 (Stillwater Sciences 2021).

6.2.2 BLM Sensitive Species

6.2.2.1 Red Hills soaproot (*Chlorogalum grandiflorum*)

Red Hills soaproot (*Chlorogalum grandiflorum*) is a perennial bulbiferous herb in the Agavaceae family. It is BLM Sensitive and CRPR 1B.2. It occurs on serpentinite and gabbroic soils in chaparral, cismontane woodland, and lower coniferous forest and blooms from May to June. It is threatened by development, mining, road construction, and vehicles, and is possibly threatened by trail maintenance, logging, and non-native plants (CNPS 2021). Within the Project Area one occurrence of Red Hills soaproot was documented in CNDDB in 1989 (CDFW 2021).

6.2.2.2 El Dorado County mule ears (*Wyethia reticulata*)

El Dorado County mule ears is a perennial herb in the Asteraceae family. It is BLM Sensitive and CRPR 1B.2. It occurs on clay or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest and blooms from April to August. It is threatened by development and vehicles (CNPS 2021). During comprehensive botanical surveys in 2021 eighteen occurrences of El Dorado County mule ears were documented throughout the Project Area, often in open areas or the understory of whiteleaf manzanita (Stillwater Sciences 2021).

6.2.3 State Listed Species

6.2.3.1 Bisbee Peak rush-rose (*Crocanthemum suffrutescens*)

Bisbee Peak rush-rose (*Crocanthemum suffrutescens*) is a perennial evergreen shrub in the Cistaceae family. It is CRPR 3.2. It often occurs on gabbroic and Ione soils in burned and disturbed chaparral areas and blooms from April to August. It is threatened by mining, development, and vehicles (CNPS 2021). Two occurrences of Bisbee Peak rush-rose were documented within the Project Area in 2021 (Stillwater Sciences 2021).

6.3 INVASIVE PLANTS

Invasive plants of concern for the Project Area (G. Hinshaw, Manager, Pine Hill Preserve, pers. comm., April 2021) are listed in Table 6-2.

Table 6-2. Invasive Plants of Concern in the Project Area.

Scientific name	Common name[1]	Cal-IPC rating[2]
Aegilops triuncialis	barbed goat grass	High
Centaurea melitensis	tocalote	Moderate
Centaurea solstitialis	yellow star-thistle	High
Dittrichia graveolens	stinkwort	Moderate
Elymus caput-medusae	medusa head	High
Nicotiana acuminata var. *multiflora*	many-flowered tobacco	–

[1] Jepson Flora Project 2021
[2] California Invasive Plant Council (Cal-IPC) rating:
High Species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Moderate Species having substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure.
– Not listed

6.3.1 Barbed goat grass (*Aegilops triuncialis*)

Barbed goatgrass (*Aegilops triuncialis*) is an annual herb in the Poaceae family with a California Invasive Plant Council (Cal-IPC) rating of High. Native to Mediterranean Europe and western Asia, it is found throughout much of northern and central California, from the Coast Ranges to the Sierra Nevada. Barbed goat grass grows at elevations below 3,300 feet in disturbed sites, cultivated fields, and roadsides (Jepson Flora 2021), as well as in disturbed and undisturbed grasslands (DiTomaso and Healy 2007). It flowers from May to July (Jepson Flora 2021).

6.3.2 Tocalote (*Centaurea melitensis*)

Tocalote (*Centaurea melitensis*) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate. Native to southern Europe, it is commonly found throughout the California Floristic Province and is uncommon in the Desert Province. Tocalote inhabits disturbed fields and open woodlands below 7,200 feet and blooms from April to July (Jepson Flora 2021).

6.3.3 Yellow star-thistle (*Centaurea solstitialis*)

Yellow star-thistle (*Centaurea solstitialis*) is a winter annual herb in the Asteraceae family with a Cal-IPC rating of High. Native to southern Europe, it aggressively reproduces by seed. Yellow star-thistle is common below 4,300 feet throughout the California Floristic Province and Mojave Desert (Jepson Flora 2021) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed areas such as roadsides and waste disposal sites (DiTomaso and Healy 2007). It flowers from May through October (Jepson Flora 2021).

6.3.4 Stinkwort (*Dittrichia graveolens*)

Stinkwort (*Dittrichia graveolens*) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate. Native to Eurasia, it is found throughout the California Floristic Province. Stinkwort inhabits disturbed areas below 2,300 feet and blooms from September to November (Jepson Flora 2021).

6.3.5 Medusa head (*Elymus caput-medusae*)

Medusa head (*Elymus caput-medusae*) is an annual herb in the Poaceae family with a Cal-IPC rating of High. Native to Eurasia, in California it is found in the Klamath Range, North Coast Range, Cascade Range, Sierra Nevada Foothills, Great Valley, South Coast Range, and the Modoc Plateau. Medusa head inhabits disturbed areas below 6,600 feet and blooms from April to July (Jepson Flora 2021).

6.3.6 Many-flowered tobacco (*Nicotiana acuminata* var. *multiflora*)

Many-flowered tobacco (*Nicotiana acuminata* var. *multiflora*) is an annual herb in the Solanaceae family. Native to Eurasia, it is found throughout the California Floristic Province and Modoc Plateau. Many-flowered tobacco inhabits open, sandy, or gravelly areas below 5,250 feet and blooms from May to October (Jepson Flora 2021).

7.0 EFFECTS OF THE PROPOSED ACTION

7.1 HERBICIDE APPLICATION EFFECTS

Special-status plant species could be affected by the application of herbicides. Table 7-1 provides the special-status species with the potential to be affected by herbicide application including bloom time and locality information for those species that have been documented in or near the Project Area.

Table 7-1. Bloom Times and Locales of Special-Status Species with the Potential to Be Impacted by the Proposed Action.

Scientific name	Common name	Location information	Bloom time							
			Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Federally Listed Species										
Galium californicum ssp. *sierrae*	El Dorado bedstraw	Occurrence adjacent to northern border and downhill of Project Area (Burge and Eldredge 2020)								
Packera layneae	Layne's ragwort	Several occurrences in the Project Area, primarily in open or disturbed sites (Stillwater Sciences 2021)								
BLM Sensitive Species										
Chlorogalum grandiflorum	Red Hills soaproot	Historical occurrence from 1989 (CDFW 2021); not located in recent surveys (Stillwater Sciences 2021)								
Wyethia reticulata	El Dorado County mule ears	Occurrences throughout the Project Area, often in open areas or understory of whiteleaf manzanita (Stillwater Sciences 2021)								
State Listed Species										
Crocanthemum suffrutescens	Bisbee Peak rush-rose	Two occurrences in the Project Area (Stillwater Sciences 2021)								

Special-status plants may be indirectly impacted by herbicide runoff[3] or drift[4] from adjacent treatments, or directly impacted by accidental application of herbicides onto the plants. Risk of herbicide exposure due to run-off in the Project Area is low due to the sandy loam soils. Herbicide application methods and BMPs (see Section 5.3, *Water Quality Best Management Practices*) would reduce the potential for impacts to special-status plants as follows:

- Targeted application:
  - Herbicide applications would be done via the most selective methods possible (e.g., directed foliar and basal stem treatments) (Table 4-1, BMP-15). Pre-emergent and broadcast backpack treatments would not be used indiscriminately to eliminate all vegetation within large areas; instead, they would be used to inhibit germination and growth of target species only.
  - Colorants would be used in each herbicide mixture (Table 4-1) to indicate application locations, ensuring proper coverage of only target species (BMP-17). Colorants are not phytoactive enough to increase the risk to special-status plants, and there are no documented instances of synergistic effects with herbicides (Bakke 2007).
- Reduced potential for runoff and drift:
  - Selective application methods (e.g., basal stem treatments, backpack applications) would be used instead of indiscriminate broadcast methods (e.g., low booms) that have increased likelihood of herbicide drift (BMP-15) (SERA 2016).
  - Application backpacks would be equipped with air induction nozzles that produce droplets 350 microns and greater in size at pressures less than 25 PSI (BMP-20).
  - Herbicide applications would be performed only during favorable weather conditions (i.e., less than 30% chance of precipitation and sustained winds less than 5 MPH) (BMP-21).
- Commitment to safety and oversight:
  - Herbicide application would adhere to all herbicide label directions and applicable laws (BMP-14, BMP-23).
  - A site/application-specific herbicide prescription would be prepared by a licensed PCA (BMP-14).
  - Measures would be instituted by the PCA to ensure safe transport, mixing, and loading of herbicides (e.g., use of spill-proof containers, mixing in pre-designated areas) (BMP-17).

---

[3] The transport of herbicides in water, generally associated with rain, across the landscape and potentially into waterways

[4] The airborne movement of herbicides, usually associated with spray application techniques.

The risk of effects from herbicide application would also be reduced by implementation of botanical protection measures (see Section 5.1, *Botanical Resources Protection Measures*). Botanical protection measures include comprehensive botanical surveys (PM-8), annual consultation to review the most current list of special-status species that might occur in the Project Area (PM-9), and flagging all occurrences of special-status plants prior to herbicide applications so that they can be clearly avoided in the field (PM-11). Flagging may be around a population of plants or near individual plants.

For added protection of the special-status plant species within the Project Area, PM-14 in the VIWMP will be replaced with the following measures:

- A PCA and BLM qualified pesticide applicator will be present on site to oversee herbicide application within the Preserve.
- No herbicide application will occur if rain is predicted within 24 hours of the time of spraying, in accordance with BLM herbicide regulations.
- SMUD will consult with BLM, USFWS, and CDFW prior to vegetation treatment to discuss proposed methods and any specific concerns (e.g., herbicide, timing, method).
- Proposed application methods and timing will consider potential non-target effects (e.g., spraying prior to bloom times to minimize potential effects on native pollinators).
- Application of herbicide containing glyphosate will only be used if the formulation of the product does not contain surfactant.
- SMUD will ensure all herbicides and adjuvants proposed for application are approved for use by BLM. Milestone® will only be applied within the Preserve with prior approval by BLM.
- Pre-emergent application of herbicides will only be used to target invasive plant populations upon approval by BLM.
- Appropriate buffer distances will be determined in consultation with BLM each year prior to herbicide applications in consideration of the proposed application method and site-specific conditions (e.g., herbicide type, timing, target species, proximity to special-status species). Applications will utilize a minimum buffer of 5 feet from flagged occurrences of special-status plants unless otherwise directed after consultation.
- SMUD will provide BLM reports summarizing any plant monitoring efforts occurring within the Preserve.

7.2 ADDITIONAL INDIRECT EFFECTS

The Proposed Action could impact special-status plants in the Project Area by altering competition with invasive plants. The VIWMP includes protection measures such as regular monitoring (PM-15), use of weed-free materials (PM-23), and species-specific control methods to reduce the spread of invasive weeds (PM-17) (see Section 5.2, *Invasive Weed Prevention Protection Measures*); these measures would continue to be implemented. However, herbicide usage would increase SMUD's ability to effectively control existing or newly introduced populations, likely decrease the number of vectors (e.g., personnel, equipment) capable of introducing invasive plants to the Project Area, and decrease the amount of disturbance to native vegetation cover that could facilitate the establishment and/or spread of invasive weeds. For these reasons, the Proposed Action is expected to have a beneficial effect on invasive weed pressure in the Project Area.

The Proposed Action could also impact special-status plants in the Project Area by altering their habitat. Herbicide usage would allow SMUD to more effectively meet the vegetation management goal of ensuring the safety and reliability of the transmission line by keeping the ROW free of tall trees and shrubs. Maintenance of more open habitat could benefit species adapted to these conditions (e.g., Layne's ragwort) and would also allow for even better and more focused management of invasive weeds which would benefit native species, including the special-status species. These species support a diverse population of native pollinator species; in the Project vicinity El Dorado County mule ears is known to host at least 40 bee species (Burge and Eldredge 2020). These pollinator species in turn support the diversity and ongoing viability of other native plants growing in the Project Area.

8.0 DETERMINATION OF EFFECTS

Implementation of the Proposed Action ***may affect but is unlikely to adversely affect*** the special-status plant species listed in Table 8-1. The Proposed Action may affect individual plants but is not likely to affect the long-term viability of any of these species. Concurrent implementation of botanical resources and invasive weed protection measures along with adherence to herbicide application BMPs described in Section 5 would adequately avoid and/or minimize adverse effects and likely result in some beneficial effects (i.e., reduced competition and reduced catastrophic fire occurrence).

Table 8-1. Special-Status Species and Determination of Potential Effect by Implementation of the VIWMP.

Scientific name	Common name	Status[1] Federal/State/ BLM/CRPR	Determination of effects
Federally Listed Species			
Galium californicum subsp. *sierrae*	El Dorado bedstraw	FE/CR/BLMS/1B.2	May affect, not likely to adversely affect
Packera layneae	Layne's ragwort	FT/CR/BLMS/1B.2	May affect, not likely to adversely affect
BLM Sensitive Species			
Chlorogalum grandiflorum	Red Hills soaproot	–/–/BLMS/1B.2	May affect, not likely to adversely affect
Wyethia reticulata	El Dorado County mule ears	–/–/BLMS/1B.2	May affect, not likely to adversely affect
State Listed Species			
Crocanthemum suffrutescens	Bisbee Peak rush-rose	–/–/–/3.2	May affect, not likely to adversely affect

[1] Status:
Federal
FE Federally listed as endangered
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare
– No state status
Bureau of Land Management (BLM)
BLMS BLM Sensitive
California Rare Plant Rank
1B Plants rare, threatened, or endangered in California and elsewhere
3 Plants about which more information is needed
California Native Plant Society Threat Ranks:
0.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

9.0 LITERATURE CITED

Atkins (Atkins North America, Inc.). 2016. Botanical Surveys Performed in Support of the Vegetation and Invasive Weed Management Plan. August.

Bakke, D. 2007. Analysis of issues Surrounding the Use of Spray Adjuvants with Herbicides. Original 2002, revision 2007. US Forest Service. http://www.fs.fed.us/r6/invasiveplant-eis

BLM (Bureau of Land Management). 2007. Sierra Resource Management Plan and Record of Decision. Folsom Field Office, California. December.

BLM. 2015. All BLM California special status plants. https://www.blm.gov/sites/blm.gov/files/programs-natural-resources-native-plants-california-special-status-plants-detailed-list.pdf

Burge, D., and L. Eldredge. 2020. Native bees of the Pine Hill Preserve. Prepared for: Mother Lode Field Office, United States Bureau of Land Management, El Dorado Hills, California.

CDFW (California Department of Fish and Wildlife). 2021. California Natural Diversity Database. RareFind5. Electronic database. Natural Heritage Division, California Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cnddb/rarefind.asp [Accessed June 2021].

CNPS (California Native Plant Society), Rare Plant Program. 2021. Inventory of Rare and Endangered Plants (online edition, v9-01 0.0). California Native Plant Society, Sacramento, California. Website https://www.rareplants.cnps.org [Accessed June 2021].

DiTomaso, J.M., and E.A. Healy. 2007. Weeds of California and other western states. UCANR Publications.

Hinshaw, G. 2008. Pine Hill Preserve Management Plan.

Jepson Flora Project, editors. 2021. Jepson eFlora. Available online: http://ucjeps.berkeley.edu/eflora/ [Accessed June 2021].

SERA (Syracuse Environmental Research Associates, Inc.). 2016. WorksheetMaker Version 6: Audit of Pesticide-Specific Data Tables. SERA TR-056-18-02b. Available online: https://www.fs.fed.us/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml

Stillwater Sciences. 2020. Botanical Survey Results. Unpublished data.

Stillwater Sciences. 2021. Draft Botanical Survey Results. Unpublished data.

USFWS (U.S. Fish and Wildlife Service). 2009. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project Number 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

USFWS. 2021. Information for Planning and Consultation (IPaC): online project planning tool. Available online: https://ecos.fws.gov/ipac/ [Accessed June 2021].

Appendices

Appendix A

Vegetation and Invasive Weeds Management Plan

Vegetation and Invasive Weed Management Plan

Hydro License Implementation • December 2017

Upper American River Project

FERC Project No. 2101

Powering forward. Together.

SMUD®

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Acronyms and Abbreviations

Acronym	Definition
ae	Acid Equivalent
ai	Acid Ingredient
AMZ	Aquatic Management Zone
ANSI	American National Standards Institute
ATV	All-Terrain Vehicle
BA/BE	Biological Assessment/Evaluation
BEE	Butoxy-Ethyl-Ester
BLM	Bureau Of Land Management
BMP	Best Management Practice
Cal DPR	California Department Of Pesticide Regulation
Cal Fire	California Department Of Forestry And Fire Protection
CDFA	California Department Of Food And Agriculture
CDFW	California Department Of Fish And Wildlife
CESA	California Energy Storage Alliance
CNDDB	California Natural Diversity Database
COC	Chain Of Custody
CPUC	California Public Utilities Commission
dbh	Diameter Breast Height
DPR	Department Of Pesticide Regulation
DSO	Distribution System Operations
DSOD	Division Of Safety Of Dams
ELAP	Environmental Laboratory Accreditation Program
ENF	Eldorado National Forest
FAC	Facilities Design, Connections, And Maintenance
FDA	Food And Drug Administration
FERC	Federal Energy Regulatory Commission
FESA	Federal Endangered Species Act
GIS	Geographic Information System
G.O.	General Order
GPS	Global Positioning System
HPMP	Historic Properties Management Plan
HQ	Hazard Quotient

Acronym	Definition
IPM	Integrated Pest Management
IROL	Interconnection Reliability Operating Limits
ISA	International Society of Arboriculture
IVM	Integrated Vegetation Management
kV	Kilovolt
MOS	Margin Of Safety
MOU	Memorandum Of Understanding
MSDS	Material Safety Data Sheets
MVCD	Minimum Vegetation Clearance Distance
NAD	North American Datum
NAS	National Academy Of Sciences
NCRS	Natural Resource Conservation Service
NERC	North American Electric Reliability Corporation
NOAA	National Atmospheric And Oceanic Administration
NOAEL	No Observed Adverse Effect Level
O&M	Operation And Maintenance
OHV	Off-Highway Vehicle
OHWM	Ordinary High Water Mark
OSHA	Occupational Safety And Health Administration
PAC	Protected Activity Center
PAL	Protected Activity Level
PCA	Pest Control Advisor
PCO	Pest Control Operator
PCR	Pest Control Recommendation
POEA	Polyethoxylated Tallow Amine
PPE	Personal Protective Equipment
PSO	Power System Operations
PUP	Pesticide Use Proposal
QAC	Qualified Applicator's Certificate
QAL	Qualified Applicator's License
QA/QC	Quality Assurance/Quality Control
RC&C	Reliability Compliance & Coordination
RCA	Riparian Conservation Area

Acronym	Definition
RfD	Daily Reference Dose
ROW	Right-Of-Way
SERA	Syracuse Environmental Research Associates, Inc.
SMUD	Sacramento Municipal Utility District
SNFPA-RCO	Sierra Nevada Forest Plan Amendment-Riparian Conservation Objective
SPI	Spray Pattern Indicators
spp	Species
SWRCB	State Water Resources Control Board
T&D	Transmission And Distribution
TES	Threatened, Endangered, Sensitive
TCP	Tricyclopyr
TEA	Triethylamine Salt
TRAQ	Tree Risk Assessment Qualification
T-ROW	Transmission- Right of Way
TVMP	Transmission Vegetation Management Procedures
TWG	Technical Working Group
UARP	Upper American River Hydroelectric Project
UCCE	University of California Cooperative Extension
UF	Uncertainty Factor
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Society
UTM	Universal Transverse Mercator Coordinate System
VELB	Valley Elderberry Longhorn Beetle
VIWMP	Vegetation and Invasive Weed Management Plan
WECC	Western Electricity Coordinating Council
WQ	Water Quality
WQC	Water Quality Control

Glossary

Term	Definition
Adaptive Management	Sensitive resource protection priorities and strategies are expected to change over the term of the license based on climate conditions, listing/decline or delisting/recovery of individual species, and the potential discovery of new resources within the UARP boundary. Consequently, sensitive resource protection will be part of the yearly discussion with stakeholders during the annual review period. Protection strategies will be updated based on stakeholder recommendations agreed upon by the group and implemented by SMUD, as appropriate and feasible.
Aquatic	Growing or living in or frequenting water; taking place in or on water.
Aquatic Ecosystem	A stream channel, lake, or estuary bed, the water itself, and the biotic (living) communities that occur therein.
Best Management Practices (BMPs)	Per the National Core BMPs (in addition to the Region 5 BMPs), Best Management Practices (BMPs) for water quality are defined as: "Methods, measures, or practices selected by an agency to meet its nonpoint source control needs. BMPs include but are not limited to structural and nonstructural controls and operation and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters."
The Border Zone	A component of the right-of-way, the border zone is the section of the transmission ROW that extends from the wire zone to the ROW edge. The border zone is managed to promote a low growing plant community of forbs, taller shrubs, and low-growing trees.
Buffer	Used in the context of GIS; a buffer is a zone of a specified distance around a feature in a coverage.
California Wildlife Habitat Relationships	A system of classifying vegetation in relation to its function as wildlife habitat. Tree-dominated habitat is classified according to tree size and canopy closure.
Coverage	A digital map or layer of data in the ARC/INFO software program.
The Danger Zone	A component of the right-of-way, the danger tree zone is located beyond the border zone, and is managed to eliminate trees that could fall and cause an outage (i.e., hazard trees).
Forest Road or Trail	A road or trail wholly or partly within or adjacent to and serving the National Forest system that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources (36 CFR 212).
Fuels	Plants and woody vegetation, living and dead that are capable of burning.
Forest Service Species of Conservation Concern	Plant or animal species which are susceptible to habitat changes or impacts from management activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the US. Fish

Term	Definition
	and Wildlife Service.
Fuels Management	The planned manipulation and/or reduction of living and dead forest fuels for forest management and other land use objectives.
Fuels Treatment	The treatment of fuels that left untreated would otherwise interfere with effective fire management or control. For example, prescribed fire can reduce the amount of fuels that accumulate on the forest floor.
Geographic Information Systems (GIS)	A computer system capable of storing, manipulating, analyzing, and displaying geographic information.
Groundcover	Natural organic and inorganic material that covers the watershed ground surface in sufficient quantity to allow a satisfactory rate of water infiltration to replenish ground water and limit erosion to natural rates. Groundcover usually consists of perennial vegetation, forest floor litter and duff, rock, downed wood, or similar erosion resistant material. Sufficient groundcover is usually 50 percent or greater, and cover of many forested ground surface areas is 80 percent or higher.
Habitat	The area where a plant or animal lives and grows under natural conditions.
Hand Piling	Piling by hand branches and limbs from tree harvests or thinnings by hand, for burning at a later time.
Hazard Tree	A standing tree with structural defects that presents a hazard to people, property or facilities, due to conditions such as deterioration of or damage to the root system, trunk, stem, or limbs or the direction or lean of the tree.
Hazard tree abatement	Hazard tree abatement includes trimming, topping the tree to a safe distance, or complete removal.
Herbicide	A substance that is toxic to plants and is used to destroy unwanted vegetation.
High Clearance Vehicle	All sport utility vehicles (SUVs), light trucks, motorcycles, and other highway-legal vehicles designed for operation on rough terrain. These vehicles are also OHVs.
In-slope	The water side of a canal.
Integrated Vegetation Management (IVM)	A programmatic, adaptive, strategy for the management of undesirable vegetation.
Intermittent Stream	A stream that flows during the wet season due to precipitation runoff and has streamflow extending partially through the dry season due to at least some groundwater contribution.
Invasive Plant	A subset of invasive plant species that are designated by the federal or state government as actionable and require management.
Limited Operating	A specified period of time during which certain land management activities

Term	Definition
Period	are prohibited.
Mastication	Shredding of brush skeletons and small dead trees (generally under 10 inches dbh).
Mitigation	Avoiding an impact by not taking a certain action or parts of an action. Minimizing impacts by limiting the degree or magnitude of the action. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
Monitoring	The repeated measurement of activities and conditions over time.
National Forest System	As defined in the Forest Rangeland Renewable Resources Planning Act, the "National Forest System" includes all National Forest lands reserved or withdrawn from the public domain of the United States, all National Forest lands acquired through purchase, exchange, donation, or other means, the National Grasslands, and land utilization projects administered under Title III of the Bankhead-Jones Farm Tennant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters, or interests therein which are administered by the Forest Service or are designated for administration through the Forest Service as a part of the system (36 CFR 212).
National Forest System Road	A forest road other than a road which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
National Forest System Trail	A forest trail other than a trail which has been authorized by a legally documented right-of-way held by a state, county, or local public road authority (36 CFR 212.1).
Natural Resource	A feature of the natural environment that is of value in serving human needs.
Noxious Weeds	Refer to Invasive Plant.
Perennial Stream	A stream that typically has running water on a year-round basis due to precipitation runoff in the wet season and continual contribution of groundwater to support streamflow throughout the dry season except in smaller streams during droughts.
Personal protective equipment (PPE)	Protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter.
Pre-emergent Applications	Herbicide applications, applied to the soil prior to the emergence of seedlings or following germination. These herbicides have the ability to prevent germination of undesirable vegetation or control undesirable vegetation during early growth. Depending on the specific herbicide chemistry, these applications can provide selective or non-selective control.
Protected Activity	Designated areas that are afforded protection to specific species by

Term	Definition
Centers (PACs)	restricting certain management activities. For example, California spotted owl PACs protect owl habitat and breeding areas by restricting timber harvest.
Qualitative survey	A qualitative survey is completed during each monitoring visit annually to a revegetation site, and consists of a pedestrian visit to characterize cover, distribution, and density of plant species.
Resource Protection	A strategy for the protection of natural resources.
Riparian Area	The area along a watercourse, around a lake or pond, or in other wetlands.
Riparian Conservation Area (RCA)	RCAs are land allocations that have an associated set of desired conditions, management intents, and management objectives. RCA widths are specifically defined for certain stream types and aquatic features within the 2004 Sierra Nevada Forest Plan Amendment Record of Decision (SNFPA). RCA widths may be adjusted at the project level if a landscape level analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths.
Riparian Ecosystem	The ecosystem around or next to water or in wetlands that support unique vegetation and animal communities as a result of a high water table.
Road	A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212).
Sensitive Species	Plant or animal species which are susceptible to habitat changes or impacts from management activities. The official designation is made by the USDA Forest Service at the regional level and is not part of the designation of threatened or endangered species made by the US. Fish and Wildlife Service.
Slash	Tree tops and branches left on the ground after logging or accumulating as a result of natural processes.
Snag	A standing dead tree. Snags are important as habitat for a variety of wildlife species and their prey.
Spatial Data	A GIS contains spatial data. The spatial data represents geographic features associated with real-world locations.
Special Aquatic Features	Lakes, ponds, vernal pools, meadows, bogs, fens, springs, and other wetlands.
Special-Status Plant Species	Plant species considered rare or of limited distribution that have been put on one or more of the following lists: Federal ESA, ENF or BLM Sensitive or Watchlist, Forest Service Species of Conservation Concern, or CNPS inventory of rare and endangered plants.
Species	A class of individuals having common attributes and designated by a common name; a category of biological classification ranking immediately below the genus or subgenus; comprising related organisms or populations potentially capable of interbreeding.

Term	Definition
Spray Adjuvants	Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions and Best Management Practices.
Suitability	The appropriateness of certain resource management to an area of land. Suitability can be determined by environmental and economic analysis of management practices.
Syracuse Environmental Research Associates, Inc. (SERA)	Worksheets by which the herbicides proposed in this VIWMP have been prepared were designed by SERA. The SERA worksheets were also used to inform the Biological Assessment/Evaluations (BA/BEs) that have been prepared to analyze the potential impacts to biological resources as a result of implementing this VIWMP.
Threatened Species	Those plant or animal species likely to become endangered throughout all or a specific portion of their range within the foreseeable future as designated by the US Fish and Wildlife Service under the Endangered Species Act of 1973.
Threshold of Concern	The level of watershed disturbance which, if exceeded, could create adverse watershed or water quality effects, in spite of application of best management practices and project design criteria.
Watchlist Plant	A species of plant of limited distribution, of public concern, locally uncommon, recently described, or occurs as disjunct populations, as determined by the local National Forest or BLM region. These plants are not afforded the same protection as USFS/BLM Sensitive Plants but populations will be recorded during surveys.
Water Quality Objectives	Water quality objectives, as listed in the Basin Plan of the California Central Valley Regional Water Quality Control Board, are the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water.
Watershed	An area of land above a given point on a stream that contributes water to the streamflow at that point.
Wetlands	Areas that are inundated by surface or ground water with a frequency sufficient to support (and that under normal circumstances do or would support) a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.
The Wire Zone	A component of the right-of-way, the wire zone includes the section of a transmission ROW directly under the wires and extending outward about ten feet on each side. The wire zone is typically managed to sustain a community of grasses, forbs, and low-growing shrubs.

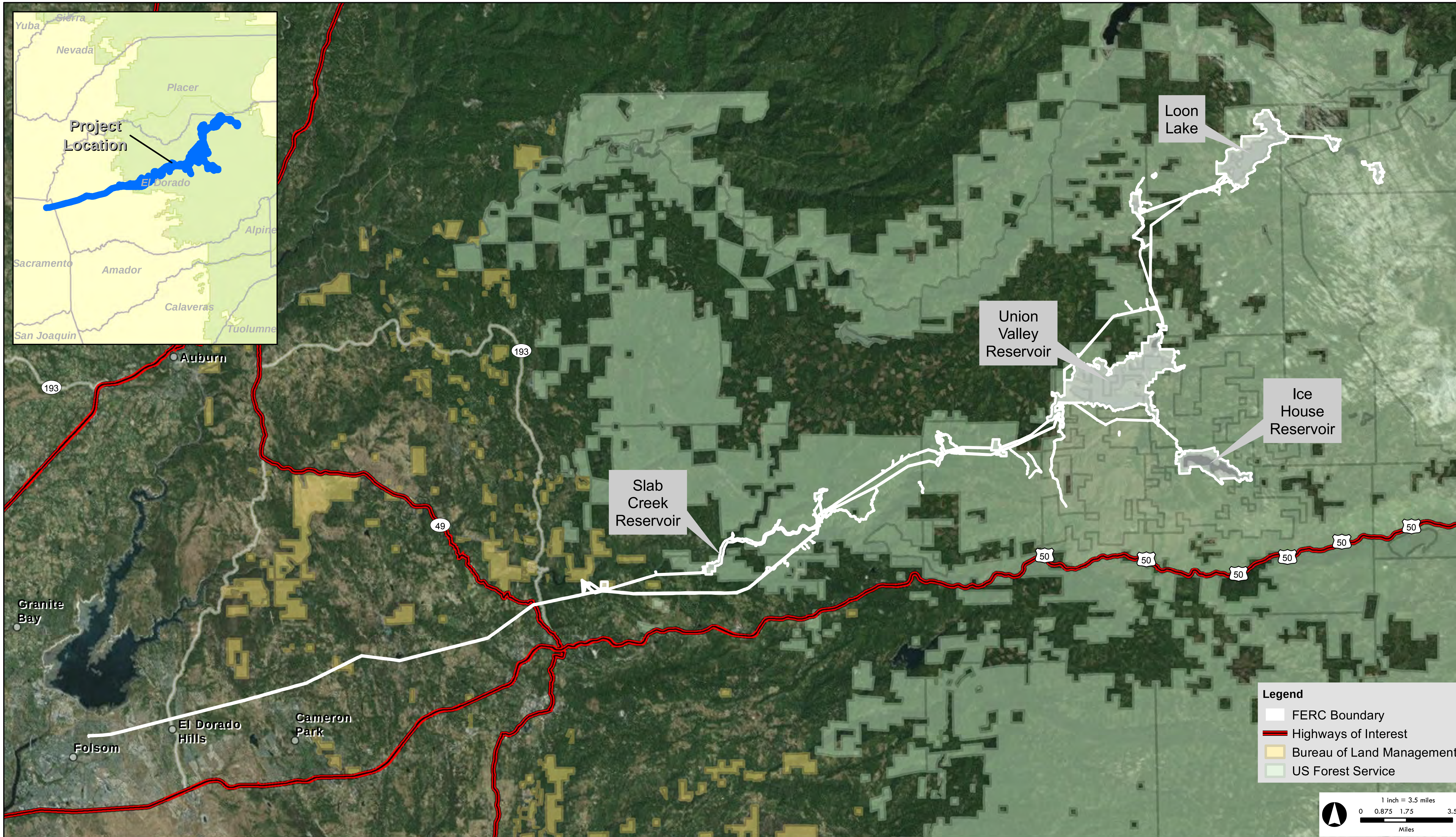
1.0 INTRODUCTION

The Federal Energy Regulatory Commission (FERC) issued a license to the Sacramento Municipal Utility District (SMUD) to operate and maintain the Upper American River Hydroelectric Project (UARP; FERC Project No. 2101) in 2014. The UARP consists of seven developments located on the Rubicon River, Silver Creek, and South Fork of the American River in El Dorado and Sacramento Counties throughout the Sierra Nevada foothills and mountains in California (Figure 1). The UARP boundary encloses a total of 10,253 acres of lands that support project generation-related features, including transmission lines, access roads, and hydroelectric facilities. Much of the UARP occupies federally owned lands administered by the U.S. Department of Agriculture, U.S. Forest Service (USFS) and U.S. Department of Interior, Bureau of Land Management (BLM). In addition, the UARP boundary includes numerous recreation-related facilities that are maintained by the USFS with funding from SMUD. SMUD is required to operate and maintain the UARP in accordance with the terms of the FERC license (FERC 2101).

SMUD has prepared this Vegetation and Invasive Weed Management Plan (VIWMP) in consultation with appropriate county, state, and federal regulatory agencies in order to satisfy State Water Resources Control Board (SWRCB), 401 Water Quality Certificate Condition 26, and USFS 4(e) Conditions 39 and 59. SWRCB Condition 26 specifies that the plan address both aquatic and terrestrial weeds and implementation of United States Fish and Wildlife Service (USFWS), Valley Elderberry Longhorn Beetle Conservation Guidelines. Condition 39 specifies that the plan address control, inventory, and monitoring of invasive weeds, and restore/revegetate areas where treatment has eliminated invasive weeds in an effort to reduce reintroduction. Condition 59 specifies that the plan address vegetation management under existing project-associated distribution and transmission lines and revegetation/rehabilitation of inadequately vegetated areas. These conditions are described in more detail in Table 1. Figures 1, 2a, and 2b, provide the location of SMUD facilities and general survey areas for sensitive plants that will be surveyed at 5-year intervals. Results will be reported at the annual meeting with the USFS and BLM (Section 3.1).

1.1 PURPOSE

The primary purpose of the VIWMP is to establish procedures and protocols for management of native vegetation and treatment of invasive weeds in order to maintain a desirable environmental condition that is consistent with the safe and effective operation and maintenance (O&M) of UARP features. In addition, this VIWMP applies to access roads that SMUD is responsible for managing that are outside the UARP boundary. This VIWMP contains descriptions of specific vegetation management actions, including treatment of invasive weeds, which SMUD will use to achieve desired conditions in and around project-related transmission corridors, facilities, and access roads. The vegetation management strategies outlined in this VIWMP describe how SMUD will achieve a variety of desired conditions, dependent on the type of site, from bare ground (powerhouses and switchyards) to compatible native vegetation communities (transmission corridors).



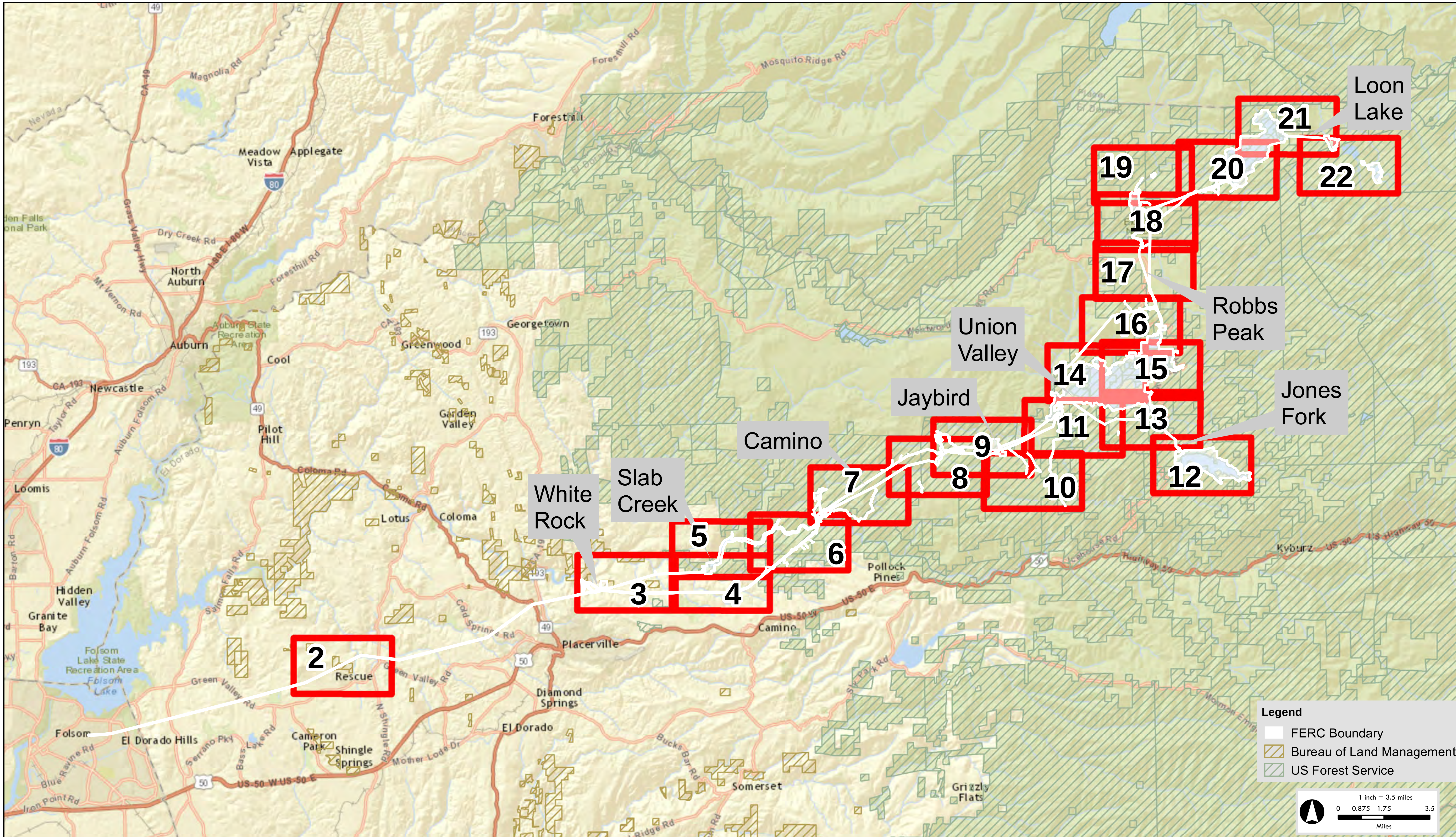
Source: SMUD, 2015; ESRI, 2015

ATKINS

FIGURE 1
Project Boundary

SMUD - UARP Invasive Weed Management Plan

1/5/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig1_UARP_Boundary.mxd



Source: SMUD, 2015; ESRI, 2015

ATKINS

FIGURE 2
Survey Area - Page 1 of 22

SMUD - UARP Invasive Weed Management Plan

1/5/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaCoversheet.mxd

Table 1. FERC License Conditions Applicable to the VIWMP in the UARP

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
USFS 4(e) Condition 39. Vegetation and Invasive Weed Management Plan	Within 2 years of license issuance, the licensee shall file with FERC an Invasive Weed Management Plan developed in consultation with Forest Service, USFWS, the appropriate County Agricultural Commissioner, and California Department of Food and Agriculture. Invasive weeds will be those weeds defined in the California Food and Agriculture code, and other species identified by Forest Service. The plan will address both aquatic and terrestrial weeds within the project boundary and adjacent to project features directly affecting National Forest System lands including, roads, and distribution and transmission lines. The Invasive Weed Plan will include and address the following elements: Inventory and mapping of new populations of invasive weeds using a Forest Service compatible database and GIS software. The invasive weed GIS data layer will be updated periodically and shared with resource agencies. Action and/or strategies to prevent and control spread of known populations or introductions of new populations, such as vehicle/equipment wash stations. Invasive plants presently identified include the following: *Aegilops triuncialis, Carduus pycnocephalus, Centaurea solstitialis, Chondrilla juncea, Cytisus scoparius, Genistia monspessulana, Lythrum salicaria, Bromus tectorum, Bromus diandrus*, and *Taeniatherum caput-medusae*. Where these populations are (1) contiguous and extend outside the Project boundary or (2) downstream of populations inside the project boundary and have a reasonable nexus to the project, the licensee shall make reasonable efforts to control the entire population unit. Development of a schedule for control of all known A, B, Q, and selected other rated invasive weed species, designated by resource agencies. On-going annual monitoring of known populations of invasive weeds for the life of the license in locations tied to project actions or effects, such as road maintenance, at project facilities, O&M activities, new construction sites,	See Introduction, Section 1.3. This VIWMP is developed in consultation with the appropriate regulatory agencies. Definition of Invasive Weeds in Section 2. Discussion of aquatic weeds in Section 3.5. Vegetation survey protocols are discussed in Section 3.4.1. Actions to protect resources and control the spread of Invasive plant populations are discussed in Section 2.1. and Section 5. A general schedule is included as Section 2. This is also based on the treatment category of a specific species, which is discussed in Section 2. Monitoring and maintenance activities are discussed in Sections 3.2 and 3.3.

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
	etc. to evaluate the effectiveness of revegetation and invasive weed control measures. The plan will include an adaptive management element to implement methods for prevention of aquatic invasive weeds, as appropriate. These actions may include, but may not be limited to (1) public education and signing of public boat access, (2) preparation of an Aquatic Plant Management Plan approved by Forest Service, and in consultation with other agencies, and (3) boat cleaning stations at boat ramps for the removal of aquatic Invasive weeds. New infestations of A& B rated weeds shall be controlled within 12 months of detection or as soon as is practical and feasible (A, B, C, & Q ratings refer to the California Department of Food & Agriculture Action Oriented Pest Rating System). At specific sites where other objectives need to be met, all classes of invasive weeds may be required to be treated. Monitoring will be done in conjunction with other project maintenance and resource surveys, so as not to require separate travel and personnel. Monitoring information, in database and GIS formats, will be provided to Forest Service as part of the annual consultation on affected Forest Service resources (Condition No 40). To assist with this monitoring requirement, the Forest Service will provide training in invasive plant identification to project employees and contractors. Licensee shall restore/revegetate areas where treatment has eliminated invasive weeds in an effort to eliminate the reintroduction of invasive weed species. Project-induced ground disturbing activities shall be monitored annually for the first 3 years after disturbance to detect and map new populations of invasive weeds.	Aquatic weeds are discussed in Section 3.5. New infestations will be discussed during the annual review period and treated using the most appropriate methods and timing described in Section 3. Monitoring and maintenance activities are discussed in Section 3.2. Annual employee training is discussed in Section 5.1. Revegetation of disturbed sites is discussed in Section 4.
	The Vegetation Plan will include and/or address the following elements: Hazard tree removal and trimming. Powerline/transmission line clearing. Vegetation management for habitat	A discussion regarding hazard trees is included in Section 2.5 Transmission is discussed in Section 2.4 Habitat improvement is

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
	improvement. Revegetation of disturbed sites. Soil protection and erosion control, including use of certified weed-free straw. Establishment of and/or revegetation with culturally important plant populations. Use of clean, weed-free seed, with a preference for locally collected seed. The licensee shall comply with the Eldorado National Forest prescriptions for seed, mulch, and fertilizer for restoration or erosion control purposes. Upon FERC approval, the licensee shall implement the plan.	discussed in Section 4. Revegetation is discussed in Section 4. Erosion control relates to the water quality discussion in Section 5. Cultural resources are considered in Section 5. Seed mixes are discussed in Section 4.2 and Table 6. SMUD revegetation will coincide with Forest Service prescriptions, as discussed in Section 4.2.
USFS 4(e) Condition 59. Vegetation Management Plan	The licensee shall file a Vegetation Management Plan that is approved by Forest Service, USFWS, and CDFW with FERC, within 2 years of license issuance or prior to any ground-disturbing activities. Address vegetation management under existing project-associated distribution and transmission lines on National Forest System lands. At a minimum, the plan shall include the following: 1. Identify and prioritize (into high, moderate, and low priority sites) all inadequately vegetated areas to be revegetated or rehabilitated along with an implementation schedule. 2. List the plant species to be used along with planting locations, methods, and densities (emphasis shall be given to use of native plant species, especially those with cultural importance). Emphasis shall also be given to using seed from certified weed-free sources and using seed from local sources, as these materials are available.	This VIWMP is intended to fulfill this requirement. Revegetation is discussed in Section 4. Revegetation methods are discussed in Section 4.2.
BLM 4(e) 4-13 Pesticide Use Restrictions	4-7 Compliance with Regulation on Bureau of Land Management Land and 4-13 Pesticide Use Restrictions in the consultation process and provisions similar to the ones described for the USFS, regarding inventory, mapping, strategies to prevent and control weeds, etc.	Annual approval described in Section 3.1.
SWRCB 401 WQC	Within 2 years of license issuance, the Licensee	This VIWMP is intended to

Condition Number and Title	Condition Text (abbreviated)	Where discussed in this VIWMP?
Condition 26. Vegetation and Invasive Weed Management Plan	shall prepare a Vegetation and Invasive Weed Management Plan (Vegetation Plan) in consultation with Forest Service, USFWS, the appropriate County Agricultural Commissioner, and the California Department of Food and Agriculture. Invasive weeds will be those weeds defined in the California Food and Agriculture code and other species identified by Forest Service. The Vegetation Plan must address both aquatic and terrestrial weeds within the UARP boundary and adjacent to UARP features directly affecting National Forest System lands, including roads and distribution and transmission lines. The Vegetation Plan must include the implementation of the USFWS Valley Elderberry Longhorn Beetle Conservation Guidelines. The Licensee shall submit the Vegetation Plan to the Deputy Director for approval of those elements of the plan that deal with Valley Elderberry Longhorn Beetle conservation and aquatic invasive weeds prior to submitting the plan to the Commission. The Licensee shall provide the Deputy Director with any comments provided by the agencies during the consultation process. The Licensee shall provide the Deputy Director with at least 90 days to review and approve the Vegetation Plan prior to submittal to the Commission, if applicable. The Deputy Director may require modifications as part of the approval. The Licensee shall file the Deputy Director's approval, together with any required modifications, with the Commission. The portion of the Vegetation Plan for which approval by the Deputy Director is required must include an adaptive management element for prevention of aquatic invasive weeds. If Forest Service, the State Water Board, or the Licensee determines that aquatic invasive weeds are present in the UARP area, the Licensee shall prepare a subsequent plan or amendment to the Vegetation Plan that describes measures designed to address the infestation, as appropriate. These actions may include, but are not be limited to (1) public education and signage at public boat access locations; (2) preparation of an Aquatic Plant Management Plan, approved by the Deputy Director and developed in consultation with other agencies; and (3) boat cleaning stations at boat ramps for the removal of aquatic invasive weeds.	fulfill this requirement and was developed in coordination with the appropriate regulatory agencies. Valley elderberry longhorn beetle are discussed in Section 5, Table 6. Aquatic weeds are considered in Section 3.5 Adaptive management for the overall plan is included in Section 5.

1.2 GOALS

There are a number of important goals that this VIWMP is designed to achieve. In some instances these goals may be at odds with each other and the parties must balance competing interests to achieve a mutually agreeable outcome. One goal that all parties agree is of paramount importance, and will therefore guide all decisions related to the management of vegetation in the UARP, is employee and public safety.

In addition to the primary goal of safety, the VIWMP is intended to meet the following, additional goals:

- Reduce Risk of Fire
- Resource Protection
- FERC License and Regulatory Compliance
- Effective and Efficient Control of Undesirable Vegetation

This plan would meet USFS Riparian Conservation Objectives (RCO) with the implementation of best management practices (BMPs) and resource protection measures. Water Quality BMPs (Table 4), watercourse buffers (Table 5), and resource protection measures (Table 6) would protect water quality, riparian and aquatic habitat, and the beneficial uses of water. Potential effects of the proposed action, either through surface runoff of sediment and chemicals or chemicals entering water bodies through groundwater sources do not constitute a significant degradation of quality or impair existing beneficial uses of water.

1.3 BACKGROUND

The UARP boundary encompasses a variety of habitats extending from about 380 to 6,540 feet (116 to 1,993 meters) elevation. A variety of documented biological resources including listed and sensitive plants, as well as invasive weeds, have been mapped within the boundary. Of approximately 10,253 total acres in the UARP, 6,284 acres are on Federal lands (53 acres BLM/ 6,231 acres USFS). Of the total area, approximately 1,017 acres are within the transmission right-of-way (ROW), which includes 299 acres on Federal land. There are also a number of roads that SMUD manages that are outside the FERC boundary where vegetation management activities would occur.

SMUD estimates that treatment of vegetation is required annually on approximately 115 acres surrounding facilities, 100-150 acres of transmission ROW, and 25-40 acres of roadside shoulder. Of these 304 gross acres, only about 150 acres actually need to be treated using herbicides because most sites use targeted applications (especially around facilities and under the transmission lines).

As stipulated in the license conditions, the VIWMP has been developed in consultation with the USFS, USFWS, BLM, the California Department of Fish and Wildlife (CDFW), the El Dorado County Agricultural Commissioner (County), and the California Department of Food and Agriculture (CDFA). Additional stakeholders invited to contribute to the development of the VIWMP include the University of California Cooperative Extension (UCCE) and the California Department of Forestry and Fire Protection (Cal Fire). Each agency was invited to participate in a Technical Working Group (TWG) hosted by SMUD that focused on the development of the VIWMP in addition to standard review and comment periods associated with UARP documents. SMUD acknowledges that vegetation management actions within the UARP should correlate with similar actions being undertaken by the various stakeholders. These collaborative efforts lend themselves to better and more efficient overall land management.

2.0 PROPOSED VEGETATION MANAGEMENT METHODS

This section includes methods, tools, and management goals that are incorporated into a comprehensive plan reflecting the needs and unique nature of the various UARP facility sites. SMUD will apply the widely-accepted concept of Integrated Vegetation Management (IVM), a programmatic, adaptive strategy for the management of undesirable vegetation. One objective of this IVM program is to establish compatible vegetation (and eliminate incompatible vegetation) near UARP facilities. Compatible vegetation is desirable or compatible with the intended use of the facility. An example of compatible vegetation in a transmission ROW are plant species that will never grow sufficiently close to violate minimum clearances with electric conductors, such as grasses, forbs, and low growing shrubs. Conversely, a 90% cover of a flammable brush, such as manzanita, averaging 4 to 6 feet tall, across the right-of-way would be incompatible, as it would limit access and present a significant risk to the conductors and other facilities in the event of fire. This same population of manzanita, but located in the canyon 200 feet below the transmission lines, would not be an issue or require vegetation management. Similarly, vegetation that encroaches on an access road and limits the lane width or line of sight is considered incompatible. For the safe and reliable operation of a hydroelectric dam, portions of the facility must be maintained to bare ground (vegetation free) in order to facilitate inspection and maintenance. Location, species, and ranking factor into control strategies for undesirable plants and/or invasive weeds.

Treatment timing and methods will vary with each population and location. In general, compatible vegetation will not interfere with the safe and reliable transmission of electricity or the inspection and maintenance of facilities. Incompatible vegetation is undesirable or unsafe and may interfere with the intended use of the facility or ROW now or at any time in the natural lifespan of the plant species. Definitions of compatible and incompatible vary depending on facility, species, density, and management requirements for those facilities. This IVM program is adaptive, and the management techniques and strategies will vary by site, but all of the potential strategies and techniques that SMUD will employ are described in this VIWMP.

IVM relies on using a variety of management tools, with the trained vegetation manager selecting the most appropriate method to control vegetation, considering safety, efficiency, cost, and environmental impacts. Sections 2.1 through 2.5 describe the methods and materials SMUD intends to use to treat native vegetation and invasive weeds. Section 5 describes the Best Management Practices (BMPs) for all vegetation control techniques to reduce risks to workers, the public, and the environment.

2.1 INVASIVE WEED TREATMENTS

Invasive weeds are those defined in the California Food and Agriculture Code and other species identified by the Forest Service or BLM. The Forest Service regularly prepares a list of invasive weeds that includes four categories of management based on the species of weeds and their characteristics. Invasive weed infestations identified during the monitoring (described below in Section 3) will be targeted for treatment during annual facility vegetation management, according to the USFS and BLM management objectives for each invasive weed. Priorities for treatments will follow the management direction in the USFS/BLM lists, based on the type of weed, the location (i.e. leading edge, etc.) and size of the population. Treatments will be timed to occur when the weeds are most sensitive to treatment whenever possible, especially for infestations targeted for eradication. Invasive weeds will be treated with herbicides or mechanical/manual methods, as described below in Sections 2.2 and 2.3. SMUD will conduct invasive weed treatments within the project boundary where infestations can be linked to project-related activity.

2.2 MECHANICAL/MANUAL METHODS

Vegetation may be cleared using large mechanical equipment (mowers/masticators), small, gas-powered equipment (trimmers or chainsaws), or hand tools. Personal protective equipment (PPE) requirements applicable to the type of equipment shall be mandatory.

- Mechanical methods of removal are effective for clearing large areas and will be used when it is necessary to clear segments of transmission ROW or reestablish sites that are overgrown with significant amounts of vegetation. These methods will include utilizing mowers, high speed flails, or rotary disk saw blades mounted on an excavator body. Mechanical methods are constrained by watercourse protection buffers, slopes, USFS Protected Activity Levels (PALs) for fire danger, inclement weather, and sensitive species or habitats. The use of an "excavator body" to conduct mechanical treatment of weeds will be excluded from BLM Pine Hill Preserve ACEC lands, due to the unique soils and rare plants present there.
- Trimmers: Herbaceous and some woody vegetation will be controlled using hand-held, gas-powered string or brush blade trimmers. Advantages of trimmers include the ability to remove a wide range of vegetation types, growth, and density over relatively large areas quickly. This tool can be easily transported into locations and used across a wide variety of terrains and habitats, including near some sensitive sites. The potential for injury is a concern with trimmer use, especially on roadways and the uneven, often steep, terrain along dams and canals. Long-term nerve damage is also a safety concern when using trimmers extensively. There are limits on size and volume of vegetation that can be

effectively treated using trimmers. Using trimmers on invasive weeds after seed has set can scatter seeds and spread infestations.

- Chainsaws: Shrubs and trees that are greater than 2 inches in diameter will be removed using chainsaws. Chainsaws can be used in most locations, including riparian areas, and on numerous vegetation types and densities effectively and efficiently. The primary disadvantage of a chainsaw is the potential for injury. Acute physical harm can result from contact with the chain at any speed above idle. Hearing loss or chronic physical injury is possible from long-term use. Physical fatigue, heat exhaustion, and dehydration are also a concern. Furthermore, noise, air quality, and seasonal fire conditions can limit the use of chainsaws.
- Hand Tools: Small woody vegetation (less than 2 inches in diameter) can be removed using loppers, pruning saws, and other hand tools. The advantages of hand tools include specificity of treatment and the low impact nature of the treatment. This method can be used on all terrain, geography, and topography. Individual plants or branches can be removed without impact to surrounding vegetation. Requirements for transport and set-up of equipment are minimal, making them ideal for use in remote areas. Furthermore, PPE requirements are minimal, and the absence of fuel reduces the risk of spill, fire, and air quality impacts. Hand tools are also preferred in areas where noise might impact nesting birds or other wildlife. Disadvantages include worker fatigue, limits on the size and volume of vegetation to be managed, and increased time and costs. The application of hand tools will be minimal and targeted, primarily to control vegetation in very small areas.
- Hand Pulling: Small woody vegetation (less than 2 inches in diameter) and non-woody invasive plants can be removed by hand pulling. The advantages of hand tools include specificity of treatment and the low impact nature of the treatment. Disadvantages include worker fatigue, limits on the size and volume of vegetation to be managed, and increased time and costs. The application of hand pulling will be minimal and targeted, primarily to control vegetation in very small areas.

2.3 HERBICIDES

Several herbicides, each with unique attributes, are proposed for vegetation management within the UARP and are listed in Table 2. There are multiple methods of application possible depending on the formulation, mode of action, type of vegetation, and period of implementation (i.e., initial or follow-up treatment). The use of chemicals to control vegetation has several advantages, including:

- Greater efficiency and cost savings, since workers can often cover much more ground using herbicides compared to manual methods,
- Reduced worker fatigue depending on the method of application and reduced risk for injury compared to some mechanical methods,

- Can be applied more safely and effectively than trimmers on challenging terrain
- Targeted chemistry can be used to selectively treat unwanted vegetation while preserving other vegetation,
- Some species are very difficult to control without herbicide,
- Reduced disturbance to wildlife and habitats as a result of fewer entries into the site and less intrusive equipment (i.e., backpack sprayers versus tracked masticator/mower),
- Application is appropriate on most terrain and environments,
- Effective on most vegetation types, sizes, and densities with variable treatment (i.e., chemical and application) options,
- Longer lasting results compared to manual or mechanical methods.

The use of herbicides is not without risk. Detailed Human Health and Risk Assessments (found in Appendix A) using the Syracuse Environmental Research Associates, Inc. (SERA) worksheets for the herbicides proposed in this VIWMP have been prepared. The SERA worksheets were also used to inform the Biological Assessment/Evaluations (BA/BEs) that have been prepared to analyze the potential impacts to biological resources as a result of implementing this VIWMP (See Appendices F and G). The BA/BE's, in turn, were used to develop the methods and Best Management Practices (BMPs) proposed in this plan. The following general risks are associated with herbicide applications:

- Acute or chronic toxicity to non-target species from drift or error in application,
- A spill of herbicide getting into a waterway or other sensitive site,
- Water contamination,
- Health risk to the public and workers applying chemicals from long-term exposure,
- Use of wrong amount or type of chemical, rendering the application unsuccessful and resulting in wasted effort and more cost,
- Negative public perception.

All herbicide applications require the following:

1. licensed and trained personnel;
2. annual safety and product training for each herbicide used;
3. use of PPE, including goggles, gloves, long pants, long-sleeved shirts, shoes, and socks, as well as any additional specific equipment specified on the product label;
4. Pest Control Recommendations (PCRs) written by a licensed Pest Control Advisor (PCA);
5. applications made by a licensed Pest Control Operator (PCO);
6. monthly reporting of each use of herbicide to the applicable County Agricultural Commissioner;
7. annual inspections by the County Agricultural Commissioner;

8. annual Pesticide Use Proposals (PUPs) for application of herbicide on lands owned by the Forest Service and BLM lands where it is appropriate to do so; and
9. annual use reporting use to the Forest Service.

Because of resource concerns, no herbicides will be used within designated wilderness areas of the Forest.

2.3.1 Herbicide Application Methods in the UARP

Below is a description of the application methods to be prescribed within the UARP and the herbicides to be used.

2.3.1.1 Post-Emergent Applications

Post-emergent applications are made after the germination and emergence of target weeds or plant species and have the ability to provide adequate control of those species. The herbicides prescribed for post-emergent applications most often have a mode of action that includes foliar uptake. See Table 2 for explanation of which herbicides will be used for this purpose.

- Directed Foliar Backpack: This type of application involves individual workers wearing backpack application equipment and using a wand with a nozzle to target applications. Nozzles are engineered to produces coarse droplet (350 Microns or greater). Applications are directed to the vegetation since the applicator has very precise control over the location and amount of herbicide application.
- Broadcast Backpack: This technique involves spraying areas to treat vegetation. Applications are not directed at specific species but rather at an area. Depending on the herbicide and its intended use, these treatments can be used to remove all vegetation in order to achieve a bare ground condition. Alternatively, if applied using selective herbicides, they remove undesirable broadleaves or grasses to achieve desired conditions.
- Low boom (all-terrain cycle [ATV/UTV]) applications are another way to apply herbicide. Depending on the herbicide, these treatments can be selective or non-selective, pre or post-emergent. This method involves the use of spray equipment mounted to a vehicle. The boom sits less than 2 feet off the ground with 1 or more nozzles directed at the ground. The applicator controls an electric pump as the applicator drives at a set pace to apply a known quantity in a continuous swath. The primary use of this equipment will be in switch yards and along access roads where bare ground condition is required. This equipment is also used to support back pack applications.
- Basal stem treatments are individual plant treatments applied using backpack sprayers. This treatment is dependent on mode of action and formulation of the herbicide. The spray is applied to the lower 18 inches of the target woody plant stem and is most effective on stems that are less than 6 inches in diameter

breast height (dbh) with juvenile bark. The herbicide is diluted in a seed oil carrier. The combination of herbicide and oil is able to penetrate the bark, providing the desired control. Basal stem applications generally have a longer application season (March through December) than other methods. Therefore, applications are frequently made during the dormant season, as deciduous plant stems are more accessible once the plants have lost their leaves. The greater accessibility typically means less over-spray during application. Dormant applications also often produce less of a visual impact because applications are made at a time when plants are without foliage, so brown-out is avoided, and the transition is gradual and less noticeable. With this application, herbicide volumes are minimal and the application is precisely targeted.

- Cut-stump treatments are used to prevent woody species from resprouting. After trees and brush are cut with a chainsaw or loppers, the stump is treated with herbicide using a backpack or 2-gallon pressurized hand can. Most cut-stump treatments can be made year-round. There are several herbicides that can be applied using this method. With this application, herbicide volumes are minimal and the application is precisely targeted.
- Frill (or hack and squirt) is an application method in which a frill or “hack” is made into the woody cambium. Small amounts of undiluted herbicide are then applied to the frill using a squirt bottle, syringe, or similar device, such that the solution does not run out of the cut. The herbicide gradually translocates to the roots and stems. With this application, herbicide volumes are minimal and the application is precisely targeted.
- Wicking (or wiping) is a plant specific, very selective method of herbicide application. Concentrated herbicide is applied directly to the upper foliage of target species using a wicking device or other piece of equipment that can brush herbicide onto the plant. Wicking devices can be mounted on the end of a backpack sprayer; there are standalone gravity feed wicking devices available as well. A very small amount of herbicide is required. A single plant can be removed from within a population via this method. It is intended for small-scale applications as it is very labor-intensive. Extreme caution must be used to avoid contact with the desirable vegetation. Using concentrated solution means any spill or droplet is very potent on any plant that it may come in contact with. This method is most effective with herbicides that are highly systemic, such as glyphosate or imazapyr.

2.3.1.2 Pre-Emergent Applications

Pre-emergent applications are herbicides applied to the soil prior to the emergence of seedlings following germination. Depending on the specific herbicide chemistry, these applications can provide selective or non-selective control.

Applications are made with backpacks or low boom spray equipment mounted on ATVs. Where vegetation management is desired, the application is made directly to the ground The benefits of pre-emergent herbicide include selectivity, increased efficacy, reduced number of applications, reduced amount of active ingredient per acre, and reduced costs compared with post-emergent herbicides or manual or mechanical methods.

Both Selective and Non-selective chemistry will be used in the UARP:

- **Non-selective pre-emergent herbicides** are generally used where bare ground conditions are required e.g., switch yards.
- **Selective pre-emergent herbicides** can be used to control undesirable broadleaf species while maintaining desirable grass species on areas such as a dam slope or along a penstock.

2.3.1.3 Spray Adjuvants

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions, and Best Management Practices. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species, as they are an important tool to mitigate potential adverse impacts to humans and natural resources. Dyes are not regulated as a pesticide and are not considered toxic to wildlife, plants, or humans (Bakke 2007). The surfactant helps the absorption of herbicide mixture into the plant. Surfactants will include 90% active, non-ionic surfactant and a modified seed oil surfactant/diluent. These products are derived from food-grade vegetable oils. Additional information on the toxicity and risks associated with dyes and surfactants are located in the Risk Assessment and BAs for the VIWMP. The application rates for each of the herbicides and surfactants proposed for use will be in accordance with each material's label instructions.

Table 2 describes the proposed herbicides, application and rate, and accompanying adjuvant. Table 2 also displays the potential tank mixes used for various application methods, and the timing of various applications at various facilities.

Table 2. Herbicides, Application, and Adjuvants

Herbicide (active ingredient)	**Application Method**	**Application Type**	**Maximum Application Rate** (pound acid equivalent or active ingredient/acre)	**Optimal Timing**	**Primary Purpose**	**Adjuvants**
Amino-pyralid	Directed Foliar / Limited broadcast	Selective post-emergent with pre-emergent activity	0.11 a.e. lbs/acre	Late winter, fall	Broadleaf invasive plant control	Surfactant (Competitor) SPI(Hi- light Blue)
Chlor-sulfuron	Directed Foliar/selective pre-emergent, broadcast backpack, low boom in switchyards	Selective pre-emergent and tank mix with Sulfometuron for bare ground	0.05 ai lbs/acre	Late winter	Broadleaf selective/ bare ground	Surfactant (Competitor) SPI(Hi-light Blue)
Clopyralid	Directed Foliar	Selective Post-emergent	0.14 a.e. lbs/acre	Spring	Broadleaf invasive plant control	Surfactant (Competitor) SPI(Hi-light Blue)
Glyphosate (aquatic)	Directed Foliar/ Cut Stump(1)/frill/ wicking, low boom in switch yards	Post-emergent non-selective	2.0 a.e. lbs/acre	Later winter thru late fall	General vegetation management	Surfactant (Competitor) SPI(Hi-light Blue)
Imazapyr (aquatic)	Foliar/cut stump/frill/ wicking	Post-emergent non-selective	0.33 a.e. lbs/acre	Summer	Brush control	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)
Imazapyr (terrestrial)	Basal stem	Post-emergent non-selective	0.33 a.e. lbs/acre	Summer-fall	Brush control	Diluent (Competitor)
Sulfomet-uron Methyl	Broadcast Backpack pre-emergent , low boom in switch yards	Pre-emergent non-selective, tank mix for bare ground control	0.14 ai lbs/acre	Late winter	Grass Selective/bare ground	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)

Herbicide (active ingredient)	**Application Method**	**Application Type**	**Maximum Application Rate** (pound acid equivalent or active ingredient/acre)	**Optimal Timing**	**Primary Purpose**	**Adjuvants**
Triclopyr TEA	Directed Foliar/cut stump/frill	Post-emergent selective, tank mix with glyphosate or aminopyralid for broader spectrum depending on target species and timing	2.0 a.e. lbs/acre	Later winter thru early fall	Weed control and woody vegetation control	Surfactant (Competitor) SPI (Hi-Light/Blazon Blue)
Triclopyr BEE	cut stump/frill/basal stem	Post-emergent Selective	2.0 a.e. lbs/acre	Fall	Woody vegetation control	Diluent (Competitor) No SPI

(1) Cut stump and basal applications are identical considering rate and technique. The difference is the removal of vegetation. Basal treatments are made to intact trees; cut stump requires the removal of the vegetation with only a stump remaining.

*Amounts may vary from year to year depending on a number of variables but will not exceed maximum. Annual specifics of volume, location, and acreage will be described in the annual PUP process.

2.4 LOCATIONS AND PROPOSED MANAGEMENT METHODS

This VIWMP applies to all of the lands in the FERC Boundary, as well as to some roads managed by SMUD outside the FERC Boundary, and includes a number of different types of facilities, which can be grouped into several categories. The strategies, methods, and materials used to treat vegetation at these sites differ depending upon the vegetation management goal for the site. All vegetation management actions will be completed using the Best Management Practices and resource protection measures described in Section 5. The three main categories of sites requiring vegetation management are these:

1. transmission right-of-ways (ROW),
2. roads and trails, and
3. hydroelectric facilities.

The strategies, methods, and materials used to treat vegetation at each type of site within the UARP are described below in Sections 2.4.1–2.4.3.

2.4.1 Transmission ROW

Management of these corridors includes maintaining vegetation that allows for the utility and safety of the feature, while encouraging compatible native habitat. As indicated above, there are about 299 acres of transmission ROW on Federal lands. The North American Electric Reliability Corporation (NERC) imposes regulations surrounding the maintenance of transmission corridors and fines associated with violations. These regulations primarily apply to the minimum allowable distance between energized lines and vegetation; the details about the understory vegetation are not regulated. SMUD manages transmission corridors in terms of zones beneath the overhead lines.

Key to this concept is the distinction of three components of the ROW: the wire zone, the border zone, and the danger tree zone (UARP 2014; Figure 3). The wire zone includes the section of a transmission ROW directly under the wires and extending outward on each side for about ten feet. The wire zone is typically managed to sustain a community of grasses, forbs, and low-growing shrubs. The border zone is the section of the transmission ROW that extends from the wire zone to the ROW edge. The border zone is managed to promote a low growing plant community of forbs, taller shrubs, and low-growing trees. The danger tree zone is located beyond the border zone, and is managed to eliminate trees that could fall and cause an outage (i.e., hazard trees).

SMUD's strategy for transmission ROW vegetation management includes the following:

- elimination of undesirable woody species within the wire zone and around tower sets along the ROW;
- maintenance of low shrub-forbs-grass cover within the wire zone of the ROW;
- maintenance of tall shrub-forbs-grass cover within the border zone of the ROW;

- maintenance of grasses only within a 2,500-square-foot area around tower structures in the ROW (bare earth around the wooden 69-kilavolt (kV) structures on the Jones Fork line, per Cal Fire standards); and provisions for worker/public safety.

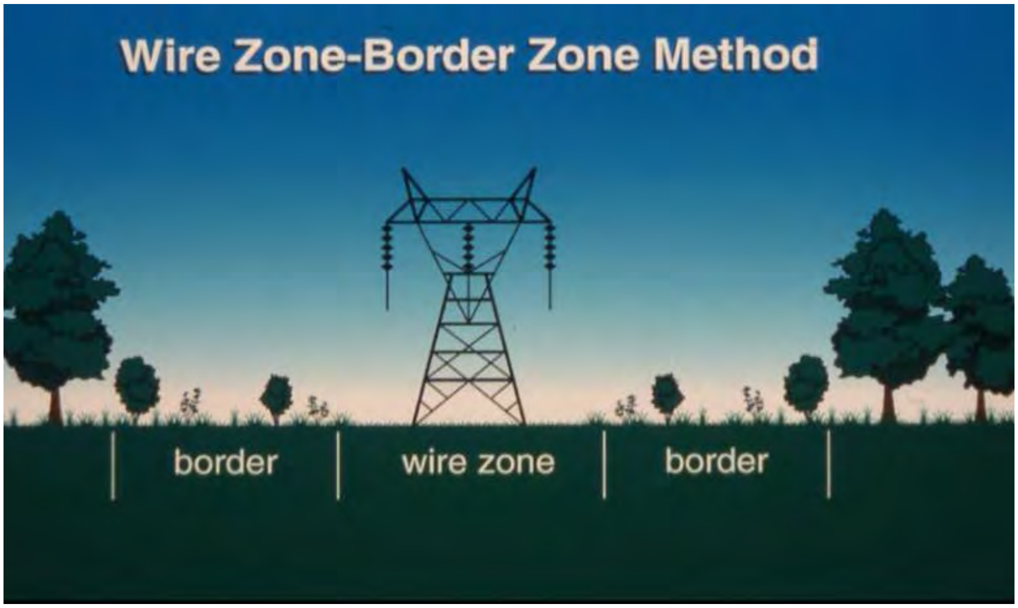


Figure 3. Wire Zone Border Method (Bramble and Byrnes 1996)

This strategy will be accomplished in three phases. The first phase involves the manual and mechanical removal of undesirable vegetation to restore or establish a desirable management condition. The second phase builds on the initial establishment using all available control techniques, including herbicide, to promote the growth of desirable species. The third phase is the long-term implementation of a maintenance program that will allow for the management and enhancement of the ROW to the benefit of all stakeholders. Ideally there will be a somewhat stable, compatible vegetation community in each zone, requiring minimal input.

2.4.1.1 Phase 1. Removal of Undesirable Vegetation

Undesirable vegetation is cleared using hand tools, such as gas-powered trimmers or chainsaws, or by mechanical means, using mowers or larger equipment, as described in Section 2.2.

2.4.1.2 Phase 2. Herbicide Application for Maintenance

To continue to manage for desired vegetation, herbicide applications will be considered within 1 to 2 years of initial manual clearing or mastication. Sites proposed for herbicide application will be inspected and evaluated as to their success potential and sensitive resource limitations.

2.4.1.3 Phase 3. Long-Term Maintenance Program

The maintenance phase of the IVM plan for the UARP transmission corridor includes continued management activities (herbicide and mechanical/manual treatments) at treated sites, hazard tree removal, and general management considerations for habitat improvement (i.e., management for desirable vegetation species). Ongoing, annual inspections and assessments will continue to determine where, what, and when to treat the ROW. Prescribed treatments will be made as appropriate and all possible methods of control described in Sections 2.1 and 2.2 will be considered.

2.4.2 Roads and Trails

Access roads and trails will be managed in phases through a combination of manual, mechanical, and herbicide treatments. SMUD has prepared a Transportation and Trails System Management Plan for the UARP (SMUD 2015b). This plan identifies the roads for which SMUD has primary maintenance responsibility, which includes roads within the FERC UARP boundary and roads outside the boundary. When applying herbicides for roadway and trail maintenance, SMUD will follow this VIWMP.

2.4.2.1 Roads

Roadway vegetation will be managed according to the Eldorado National Forest, Standard Road Maintenance Specifications for Roads (March 2014). Specifically, Sections 806, 816, 831, 842 and 854 discuss elements of vegetation control and hazard tree removal. The general purpose of SMUD's roadway vegetation maintenance is to provide for safe travel on roads throughout the UARP. Facility O&M requires a variety of access roads with surfaces that vary from unimproved dirt to asphalt. The road surface and sides are generally managed in bare ground for fire safety. Typically the road bed of a native surface road is relatively barren and does not need to be sprayed; however, there may be occasions when a road needs to be treated with herbicide for safety purposes. The sides may have a drainage ditch that is kept clear of vegetation or kept with low-growing grasses and forbs to keep water from accumulating on the road surface. Some road drainage systems are lined with gravel to reduce erosion.

Trees and woody brush are generally maintained at least ten feet from the edge of the road to allow for adequate visibility and passage without encroachment. In addition to access and general passage, vegetation is thinned at and through corners (i.e., line of sight) to improve visibility and maximize traffic safety. When line of sight is compromised or brush is encroaching onto roadway edges such that vehicle travel is being impaired, manual methods, such as chainsaws and trimmers, will be used to remove vegetation. In some instances in which management has been neglected, it may be appropriate to use masticating equipment mounted on a rubber-tired vehicle with a boom, which allows greater mowing flexibility along the road edge. Where appropriate, herbicides will be applied with the cut stump method to prevent the regrowth of vegetation.

For general maintenance in which brush and tall weeds may be approaching thresholds for affecting line of sight, directed foliar herbicide applications will be made to manage brush and ROW towards the desired condition. Shoulders of paved roads will be maintained to allow for vehicle travel and parking without risk of fire. Invasive weeds occurring in or along access roads will be addressed as part of annual routine operations and maintenance. For the purpose of herbicide applications, methods may include backpack sprayers or ATV- mounted sprayers.

2.4.2.2 Trails

Trails are required for access to canals, penstocks, stream gages, and weirs. These foot trails are generally 2-3 feet wide to allow unimpeded access and are usually managed in either low-growing grasses or bare ground. Trails are established with manual tools, such as chainsaws and trimmers, and the primary mode of vegetation management will be with manual methods. Lop and scatter techniques will be used to dispose of woody materials. Post-emergent herbicides will be applied using targeted foliar applications with backpack sprayers to control undesirable vegetation as needed.

2.4.3 Hydroelectric Facilities

Desired vegetation conditions and treatment methods/strategies for various hydroelectric facilities are discussed in this section and summarized in Table 3. For additional information about all SMUD facilities, please refer to SMUD's UARP Facility Management Plan.

Table 3. Summary of Herbicide Treatments by Facility Type

Facility Type[1]	Desired Condition	Potential herbicide application	Frequency of Treatment/Acres
Earthen Dam/dyke	Low-growing herbaceous cover ok; no woody vegetation; needs to be clear for inspections.	Selective for weeds; Aminopyralid, clopyralid,sulfometuron methyl, chlorsulfuron, Triclopyr TEA; bare ground toes and groin.	Annual/48
Concrete dam	No woody vegetation in groins; needs to be clear for inspections	Directed foliage; imazapyr, glyphosate	As needed/3
Powerhouse	Bare Ground; some herbaceous cover ok	Low boom, backpack directed , Glyphosate, chlorsulfuron, sulfometuron	Annual/7

Facility Type[1]	**Desired Condition**	**Potential herbicide application**	**Frequency of Treatment/Acres**
Penstock ROW	Herbaceous vegetation ok; no woody vegetation over 24"	Directed foliar, basal, cut stump.; triclopyr TEA, triclopyr BEE, Imazapyr, glyphosate	As needed/21
Canal	No woody vegetation; berm needs to be clear of woody vegetation; some low-growing herbaceous vegetation ok	Edges clear for inspection/ Direct foliar imazapyr, glyphosate/ triclopyr TEA	Annual/ 22
Spillway	Bare Ground	Cut stump and directed foliar; glyphosate and triclopyr TEA	Annual/ 4
Switchyard	Bare Ground	Low boom broadcast soil; chlorsulfuron Glyphosate, sulfometuron methyl	Annual/1
Gate house/Valve house	Low-growing herbaceous vegetation ok; woody vegetation adjacent to site cleared; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	Annual/2
Surge Chamber	Low-growing herbaceous vegetation ok; woody vegetation adjacent to site cleared; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	Annual/1
Hydromet station	Low-growing herbaceous vegetation ok; tall trees cleared	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	As needed/1
Telecom site	Low-growing herbaceous vegetation ok; tall trees cleared, including line-of-site	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE	As needed/1

Facility Type[1]	Desired Condition	Potential herbicide application	Frequency of Treatment/Acres
Transmission ROW	Wire Zone-Border Zone concept; low to moderate height woody vegetation ok; no tall trees	Direct foliar, cut stump, basal; Glyphosate, triclopyr TEA, imazapyr, triclopyr BEE Weeds; aminopyralid, clopyralid	A portion will be treated annually/300
Roads	Shoulder cleared of tall vegetation out to 5 ft.; some tree & brush removal beyond 5 ft. for better visibility	Direct foliar, Glyphosate and triclopyr TEA, (chlorsulfuron and sulfometuron may be used in limited situations with USFS/BLM approval) low boom or backpack soil to turnouts and shoulders for fuels abatement	A portion will be treated annually/40

Notes:
[1] See SMUD's UARP Facility Management Plan.

SMUD will conduct vegetation management operations as part of general O&M work at hydroelectric facility sites located within UARP boundaries. Specific treatments for the different facility sites are described below.

2.4.3.1 Canal

The top of the canal berm provides access for vehicular and pedestrian traffic and is generally maintained as bare ground. The berm slope can vary in length, and vegetation is managed for grasses and low-growing broadleaf species; woody vegetation is removed. The berm slope must be accessible to check for leakage and vertebrate pest problems. The berm access road must also be kept clear of vegetation to provide safe access for staff and the public, as well as to discourage vertebrate pests from invading the area.

Along the top 10 feet of the canal berm and the face of the berm down to the toe, chainsaws and trimmers will be used to control woody species greater than 24 inches tall. Hazard trees may also need to be occasionally removed adjacent to the canal. Both pre-emergent (soil applied) and post-emergent herbicides will be used. Low-volume, directed foliar and low-volume basal applications with backpacks will be used to control re-sprouting woody plant species that are encroaching on the berm, ingress and egress points, and canal berm face and toe. Backpack applications may be made from the canal access road to the canal berm (not inside the canal face). These applications will utilize non-selective, pre-emergent herbicides or targeted, foliar post-emergent herbicides. Only backpack applicators will be used on the canal berm adjacent to the water.

The in-slope (water) side of the canal is kept free of woody vegetation (where the canal is not lined with concrete or synthetic barrier) for approximately ten feet above the ordinary high water mark (OHWM). Herbicide applications on the inner berm would be done when the canal is dewatered. Chainsaws and trimmers will be used for control of woody species greater than 24 inches tall along the top 10 feet of the canal bank. Low-volume, directed foliar and cut surface treatments, using glyphosate (aquatic) imazapyr (aquatic) and Triclopyr TEA within 10 feet of water along the canal, will be used to control any re-sprouts of woody plant species encroaching on the canal channel and to encourage annual grasses and broadleaf species. Pre-emergent applications will not be used in this situation. The control of woody species is necessary to maintain flow and prevent blockage. The herbicide treatment will be applied with backpack sprayers when the canal is de-watered.

2.4.3.2 Penstocks

Generally, a 10-foot area on both sides of these structures requires vegetation management. The vegetation in this zone can be managed for grasses/forbs or bare ground, depending on soils, slope, and specific maintenance requirements. For ten feet on each side of the penstocks, chainsaws and trimmers will be used for control of woody species greater than 24 inches tall. Hazard trees adjacent to the penstock may also need to be occasionally removed. A low-volume, directed foliar post-emergent herbicide treatment will be applied to re-sprouting woody plants to promote better access, to encourage the development of low-growing herbaceous plant cover, and to aid routine inspections. Post-emergent, directed or broadcast applications will be used and treatments will be made with backpack sprayers.

2.4.3.3 Dams

Earthen dams generally have three zones that require vegetation management:

1. The top of the dam is generally graveled and requires a bare ground treatment. Pre-and post-emergent herbicide applications with backpack sprayers will be used to maintain these facilities.
2. The inside slope can be managed in grasses. Trimmers are used to control excessive vegetation and chainsaws are used to control larger woody species that are proximate to the dam to eliminate habitat for rodents and to allow for inspection. No herbicides would be used.
3. The outside slope is generally managed in low-growing grasses/forbs and requires control of woody trees, brush species, and tall herbaceous vegetation with trimmers and occasionally chainsaws to maintain facility integrity, allow for inspection, and eliminate habitat for rodents. The groins and toe must be maintained with minimal vegetation to allow for inspection, discourage rodent activity, and prevent roots from impacting structural integrity. Cut-stem or frill

treatments with herbicides will also be used to maintain control of woody vegetation. Directed foliar backpack applications will be used in situations where vegetation is excessive and mechanical weed trimming is not practical.

2.4.3.4 Concrete Dams

Vegetation at groins must be managed and kept free of woody species that could impact the structural integrity and prevent unobstructed visibility during inspections.

Chainsaws and trimmers are used for control of woody species at specific locations, as required by the Division of Safety of Dams and FERC inspectors. A low-volume, directed post-emergent herbicide treatment will be used to control resprouting vegetation at dam sites. Cut-stem or frill treatments with herbicides will also be used, as needed, to maintain control of woody vegetation.

2.4.3.5 Powerhouses and Switchyards

The land within the switchyards and substations is generally maintained in a bare ground condition or is covered with gravel or asphalt in order to protect electrical equipment and to minimize fire and safety hazards. Trimmers and mowers cannot be used adjacent to insulators and conductors due to safety considerations. Pre-and post-emergent herbicides will be used to maintain these facilities in a bare ground condition. Broadcast pre- and/or post-emergent applications will be made with backpack sprayers. Hazard trees may also need to be occasionally removed adjacent to these facilities (refer to Section 2.5 below). In addition, trees surrounding these facilities that block communication transmitters and receivers occasionally need to be trimmed or removed.

2.4.3.6 Weirs

Weirs are structures that are used to measure water flow and are commonly located below dams to measure leakage or minimum flows. The weirs must be relatively clear of vegetation to facilitate inspections and accurate measurements. Low-growing grasses are usually the preferred vegetation cover. Trimmers, chainsaws, and hand-tools will be used to control vegetation near the concrete weirs.

2.4.3.7 Spillways

Spillways are located below dams and canals and connect to natural drainages. Spillways that are associated with dams and canals are designed to protect these facilities during high intensity storms or emergency events by diverting excess water into natural drainages. The density and type of vegetation within the spill channel must not impede the flows, as this could cause the water to exit the natural drainages and result in flooding or erosion. No vegetation should be present in concrete-lined spillways; low-growing forbs and grasses are the preferred cover on the bottom and sides of unlined spillways (a few spillways have natural rock bottoms and no concrete lining). Manual removal of brush and trees, coupled with cut-stem herbicide applications, will be used. Directed-foliar, backpack applications to berries, small trees, re-sprouting brush, and weeds will be used as needed when the spillway is not actively flowing. Only herbicides approved for aquatic applications will be used, as listed above in Table 2.

2.4.3.8 Telecommunication and Hydromet Facilities

Vegetation management at these facilities is primarily by manual means to control vegetation encroaching on the site and to maintain line-of-sight between telecommunication facilities. This will involve targeted tree trimming and tree removal on an infrequent, as-needed basis. SMUD will dispose of removed vegetation in accordance with Forest Service protocols in effect at the time the work is performed. Directed foliar backpack applications will be used around the base of these sites as appropriate.

2.5 HAZARD TREE IDENTIFICATION, REMOVAL AND DISPOSAL

There are several vegetation clearance requirements for transmission ROWs regulated by the California Public Utilities Commission, California Resource Code, North American Electric Reliability Corporation (NERC), and Federal Energy Regulatory Commission (FERC). NERC, in particular, requires that Minimum Vegetation Clearance Distances are maintained for separation between transmission conductors and vegetation. Appendix B provides the clearance requirements in order to meet NERC (and other) regulatory standards. Trees at heights beyond the minimum clearance standards are considered hazard trees.

Hazard trees include those with structural defects resulting in the potential for the tree to fail and cause damage to people, property, or facilities. Failures do not occur at random, but are the result of a combination of defects and aggravating conditions. The evaluation system includes the following:

1. development of species' profiles to identify specific failure patterns;
2. consideration of site characteristics, such as general climate and precipitation, management history, soils and local hydrology, history of the site pertaining to hazard trees, site changes over time, and obstructions to tree development;
3. stand considerations (i.e., trees in closed stands have a different canopy structure and trunk development than open-grown trees);
4. tree growth and form, including crown form, trunk aspect, and overall health;
5. tree defects (root crown, trunk, and branches);
6. maintenance history (i.e., previous pruning); and
7. evaluation of potential targets.

Sites are evaluated annually. Following the evaluation, trees requiring abatement are prioritized based on their overall risk. SMUD intends to implement, where appropriate, the International Society of Arboriculture's (ISA) Best Management Practices for Tree Risk Assessment for evaluation of hazard trees along SMUD electric overhead facilities. Hazard tree identification would be performed by a certified arborist or natural resource professional with a Tree Risk Assessment Qualification (TRAQ) from the ISA or equivalent. This qualification from ISA trains arborists to use a standardized system to identify and assess risks from hazard trees and promotes the safety of people and property. The USFS and BLM will be provided a list annually (or as needed) that indicates the type, sizes and locations of hazard trees to be removed. The USFS and BLM will review and provide approval as necessary and appropriate.

Hazard tree abatement includes trimming, topping the tree to a safe distance, or complete removal. Mechanical means are typically used and adjusted per specific site conditions. Once removed, debris and tops are chipped, lopped, or burned, where possible. Any remaining wood and logs are disposed of in accordance with Forest Service requirements or are left in place and secured to prevent rolling off target or moving down slopes.

3.0 MONITORING AND REPORTING

Monitoring refers to the repeated measurement of activities and conditions over time. A number of ongoing monitoring activities are associated with this VIWMP and each are discussed below. Some monitoring activities will be regimented and others will be more casual observations. Reporting on the results of the monitoring will also take a variety of forms, such as a verbal conversation about monitoring results and an email or a written report.

3.1 ANNUAL COORDINATION

Each year SMUD will provide the land managers (Forest Service and BLM) a summary of the season’s invasive weed and hazard tree mitigation management actions, along with any possible results of effectiveness monitoring, by September 30. SMUD will also present a summary of invasive weed treatments from the previous season at the Annual Review of Ecological Conditions meeting each May. A Pesticide Use Proposal (Form FS-2100-2) for application of herbicide on lands owned by the Forest Service and BLM lands where it is appropriate to do so, will be completed and submitted by December 1 for treatments planned for the following calendar year. SMUD will also include additional information about the proposed treatments with the PUPs, which would include the following:

- A map and GIS data showing locations to be treated along with adjacent sensitive resources
- A list of locations identifying what type of invasive weeds will be treated and proposed treatment method
- An approximate timeline of treatments, including invasive weed treatments to ensure timing of weed treatments coincides with best management practices for weeds

- Any proposed revegetation

The Forest Service and BLM will provide approval of the PUPs by February 15 of the following year. SMUD and the land managers will hold a meeting in January to discuss the proposed treatment recommendations for the upcoming year and/or modifications of items in this VIWMP (i.e., target species, survey areas, treatment methods, etc.).

3.2 ANNUAL EFFECTIVENESS MONITORING

There are two basic situations under which vegetation management occurs at SMUD facilities. In some cases, sites are treated annually to keep unwanted vegetation under control. Switchyards, powerhouses, and dams are examples of the first situation. For these sites, SMUD will monitor the treatment effectiveness after the applications and determine if follow-up vegetation management activities are necessary. A monitoring form will be developed; will document presence of invasive species, type and relative amounts of vegetation (undesirable woody or herbaceous), density of vegetation; and will describe why amounts are/are not acceptable. Additional annual inspections by DSOD and FERC occur at most facilities and, if vegetation conditions are unacceptable, treatments may occur immediately or the following season, as conditions warrant.

The second situation involves sites that are treated based on observed conditions during annual monitoring. Transmission and penstock ROWs are examples of this second type of site. Prior to the start of vegetation management activities for the season, SMUD will visit these types of sites to determine if any vegetation management is necessary. Ratios of compatible to incompatible species will be assessed. Population densities of target species listed on the pest control recommendation and cited in the PUP will be evaluated, and efficacy of prior treatments will be determined. Monitoring must occur early in the season prior to prescription of vegetation management methods and preparation of the pest control recommendation by the PCA. Follow-up monitoring will occur 6 to 8 months after treatment to determine efficacy, if weather permits.

Annual effectiveness monitoring will include monitoring invasive weed infestations that are currently targeted for control or eradication. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments or potentially different treatment strategies are needed. If new treatment methods or strategies (not identified in this plan) are recommended for an infestation SMUD would provide the FS with the rationale for the proposed changes during the annual coordination meeting. Where past treatments have successfully controlled or eradicated an infestation, SMUD will continue to monitor the infestation annually until it is determined that treatment objectives have been met (based on expected seed bank longevity of the targeted species).

For any invasive weed treatments performed in any given year by SMUD, SMUD will perform post application monitoring to document the efficacy of the treatment. In most cases, the goal will not be to eradicate the population unless it is a USFS-Group 1 weed, an isolated population of a Group 2 weed, or its considered a “Potential Invasive”. If eradication is the management goal, SMUD will perform a detailed estimate of the population remaining later in the season and again the following year to document whether any of the weeds are still present. If weeds are still present, SMUD will continue to treat (using any of the approved techniques or herbicides) until the population is eradicated. If after 3 years of continuous treatment, the population persists, SMUD will work the USFS or BLM to re-evaluate whether eradication is the appropriate management strategy. For other weeds, where eradication is not the goal, SMUD will provide an estimate of weed cover and continue to treat sites according to the management priority identified in the annual list of invasive plants

3.3 POST-CONSTRUCTION/REVEGETATION MONITORING

Following identification of a potential revegetation site and following implementation of revegetation actions (if there are any), monitoring will occur annually for a minimum of 3 years to determine whether to reseed. Where revegetation objectives have not been met, additional treatments will be implemented. Following ground disturbance in which there is a potential to introduce invasive weeds, monitoring would also occur for 3 years to determine if control is needed. Qualified personnel, familiar with vegetation communities within the UARP boundary, will perform the monitoring. Results will be reported at the annual meeting with the USFS and BLM (as discussed in Section 3.1).

Qualitative surveys, consisting of a pedestrian visit to estimate percent cover, distribution, and density of plant species, will be completed during each monitoring visit. Qualitative data is considered appropriate due to the small scale of the revegetation activities included under the VIWMP. Dominant species will be recorded along with any invasive weeds and their relative abundance. As appropriate, representative photographs will be taken at revegetation sites to more accurately depict changing conditions over time and to facilitate future management decisions.

For erosion control purposes there must be 70% or greater effective soil cover on slopes exceeding 35%, shallow or other soils with high runoff potential, or soils within RCAs (widths as defined on page 42 of the SNFPA). For all other areas, soil cover should be 50% or greater. If vegetation does not provide soil cover it should be provided by straw or other approved mulch. If vegetation provides this level of coverage then revegetation will be considered successful. If vegetation does not provide the level of soil coverage but vegetation is commensurate with surrounding vegetation and adequate mulch is covering the soil then the site will be considered restored. It is not necessary to consider effective soil cover where soil cover is not normally expected such as road treads, quarries, or other areas that were previously substantially devoid of vegetative cover.

3.4 COMPREHENSIVE UARP BOTANICAL SURVEYS

Every 5 years, a comprehensive survey for special-status plants with suitable habitat in the project area and invasive weeds will be performed at SMUD facilities (i.e., in transmission ROW, along SMUD-owned roads, and adjacent to hydroelectric facilities) within the UARP boundary, except in areas where activity is non-existent or minimal. For example, surveys will not be conducted along ROWs for underground penstocks/tunnels or in areas that cannot be traversed safely on foot. Furthermore, SMUD will survey around active recreational facilities (campgrounds and boat ramps) and at selected dispersed camping areas within the UARP boundary that are under Forest Service management (in consultation with the Forest Service). For some limited situations, SMUD may increase the survey coverage area outside the FERC boundary if there is a compelling reason to do so. This will be determined in consultation with the USFS/BLM prior to beginning the 5-year survey effort.

3.4.1 Survey and Mapping Methods

The survey would take place across a single season and begin at lower elevations and proceed to higher elevations, which should allow for all plants to be assessed at an appropriate phase of phenology for identification purposes. However, specific survey areas may require more visits, depending on the timing of the bloom of the species and climate conditions. SMUD will consult with the land management agencies prior to the surveys to discuss logistics and other items of concern and to get the latest weed and sensitive plant lists.

SMUD shall conduct thorough pedestrian surveys of all identified facility locations within the UARP for special-status and invasive species. The extent of the survey at any particular site would be discretionary based on conditions observed by the surveyor and landscape features, including habitat, soil type, etc. Field surveys shall be conducted to the intensity necessary to discover the plants.

Specific survey protocols are as follows:

1. All sensitive natural communities, such as lava caps and fens, located within survey areas shall receive “Complete Coverage.” “Complete Coverage” is defined as areas to be surveyed by walking transects spaced so that that the next transect is clearly visible and so that all of the areas have been examined thoroughly.
2. Roadside buffers within and adjacent to designated survey areas shall receive Complete Coverage within approximately 10 feet of the roadside. There may be exceptions to the standard 10-ft roadside buffer and botanical survey specifications and these will be discussed at the annual coordination meeting
3. Transmission corridors shall receive Complete Coverage in the wire and border zones and Intuitive Coverage in the off-ROW or danger zone. “Intuitive Coverage” requires areas to be surveyed by walking transects that cover a representative cross section of all major features and habitats within the immediate area. Habitats with low potential for the species (as determined by the qualified surveyor onsite and based on current site conditions) shall have at least 10 percent of the area covered with transects. Habitats identified as having a

high-to-moderate potential for the species shall have at least 75 percent of the area covered by transects.
4. Structures and other facilities (i.e., buildings and other SMUD infrastructure) shall be surveyed with Complete Coverage.
5. Recreation sites shall be surveyed with Intuitive Coverage.
6. Only invasive weed occurrences that are rated by the California Department of Food and Agriculture as “A”, “B,” or “Q,” and by the Eldorado National Forest (ENF) or BLM lists as targets for treatment, will be mapped. Occurrences of new invasive weed species that are of concern will also be mapped (Group 1-3 and any on the Potential List).

Invasive species occurrences shall be recorded within and directly adjacent to the UARP boundary; however, if occurrences of invasive weeds originate within the boundary and extend into National Forest System lands, and BLM lands where it is appropriate to do so, the extent of any occurrence attributed to project activities shall be recorded up to 300 feet from the boundary. Treatment of extensive populations beyond the UARP boundary, if applicable under the license, would be accomplished after consultation with the Forest Service and/or other agencies as appropriate. Species nomenclature shall follow the Jepson Manual, or abbreviations shall follow the Natural Resource Conservation Service (NRCS) National Plant Database symbol protocol from the NRCS website.

Previously mapped occurrences of both special-status and invasive species that occur within the survey area will be verified and recorded as unchanged or updated, as appropriate. New species populations identified during surveys will be delineated using the latest, available electronic methods, as described below:

1. Sensitive/Watch List Species and Sensitive Habitats
   a) Hang 2-foot pink/green flagging (or flags consistent with ENF standards) about every 25 feet around the perimeter of the occurrence or special habitat, upon discovery.
   b) Label one set of flagging (Informational Flag) nearest the logical access point to the site perimeter with the species code, occurrence number, date, and surveyor’s initials in permanent black ink. For example, “CACLA-09 12 May 2016 CB.”
   c) By using Global Positioning Systems (GPS) along the perimeter of each occurrence or special habitat and including data on discovery forms and submitting data as an ArcGIS shapefile. The GPS locations should have a horizontal accuracy of a minimum of 5 meters. Polygons are the preferred GPS method; however, point data will be collected for occurrences with an area less than 2,500 square feet (about 50 feet by 50 feet), and line data will be collected for occurrences limited to roadsides. Point or line data will be buffered to create a polygon for submission to the Forest Service. The mapped locations shall be recorded in the following coordinate systems (or in

whatever system is consistent with ENF standards at the time of the survey): NAD 1983, CONUS, UTM Zone 10, and meters.

d) Complete the Sensitive Plant Occurrence Discovery Record form using the most efficient method available (see Appendix C).

2. Invasive Species Infestation
   a) Hang 2-foot orange invasive plant flagging (or flags consistent with ENF standards) approximately every 50 feet around the perimeter of the infestation, upon discovery. Flags shall be hung as near to eye-height as possible.
   b) Label one set of flagging (Informational Flag) nearest the logical access point to the site perimeter with the species code, infestation identification, date, and surveyor's initials in permanent black ink. For example, "CHJU-03 12 May 2016 CB."
   c) GPS the perimeter of each infestation on discovery and submit to Forest Service and other resource agencies upon request as an ArcGIS shapefile. Polygons are the preferred GPS method; however, point data will be collected for occurrences with an area less than 2,500 square feet (about 50 feet by 50 feet), and line data will be collected for occurrences limited to roadsides. The GPS should have an accuracy of at least approximately 5 meters. Point or line data would be buffered to create a polygon for submission to the Forest Service. The mapped locations shall be recorded in the following coordinate systems (or whatever system is consistent with ENF standards at the time of the survey): NAD 1983, CONUS, UTM Zone 10, and meters.
   d) Complete the Invasive Weed Monitoring form using the most efficient method available and document the infestation with a photo and point record, if appropriate (see Appendix D).

All occurrences of invasive species will be documented (some low priority, ubiquitous weeds may not be mapped if the land managing agencies agree that mapping is not useful). Occurrences of invasive weeds, which are not targeted for control, may be recorded, if deemed necessary, following consultation with the land managing agencies.

3.5 AQUATIC WEED MONITORING

As a component of SMUD's aquatic weed adaptive management program, SMUD will perform simple presence/absence surveys for aquatic weed species of concern, in conjunction with monitoring efforts for invasive aquatic invertebrates at boat ramps and other sites (See Section 5.6 below). If the presence of an undesirable aquatic weed is confirmed, SMUD will consult with stakeholders as soon as reasonably possible to determine follow-up actions.

3.6 PESTICIDE USE REPORTING

Forest Service Handbook 2109.14 (USFS 2016a) guides pesticide use on National Forest System (NFS) lands and requires compliance with Forest Service standards and guidelines and other management direction. Licensed Pest Control Advisors (PCAs) will manage and prepare all recommendations for the use of herbicides. Herbicides are used to help control unwanted vegetation. In each specific location, a PCA will evaluate a variety of environmental and biological factors. These factors include, but are not limited to, the following: existing vegetation composition; topography; soil type; hydrologic features; surrounding wildlife, including Threatened and Endangered species; domestic animals; livestock; resident adjacency; apiaries; and proximity to and volume of recreational use. Based on this evaluation process, the PCA will determine the appropriate product, application rate, timing, and method for each location. The annual PUPs submitted to the ENF for approval will identify the specific chemicals recommended for a specific locale.

This VIWMP outlines a vegetation management program that provides the flexibility to make the best use of a variety of proven herbicides to adapt to changing circumstances for the protection of facilities and forest resources. Any new herbicides proposed would require approval by the USFS or BLM. A GIS layer with area treated, methodology, and chemical information will be submitted to FS by September 30th to allow for FS data entry for their annual pesticide application reporting requirements due in mid-October. At the end of the season, SMUD will submit a Pesticide Use Report to the ENF, which describes the locations and amounts of each pesticide applied during the season. If pesticides are applied to BLM land, SMUD will report usage totals to BLM as well.

3.7 WATER QUALITY MONITORING

SMUD will monitor water quality of perennial streams adjacent to treated areas to document the effectiveness of proposed buffers for one year for each herbicide proposed (see Appendix E: Water Quality Monitoring Plan). Water samples will be collected above and below a subset of treated areas before and after applications and within 60 days of the herbicide application. The number of water samples collected will depend upon the size of the treatment area, which will vary from year to year.

Water quality monitoring is not proposed for Project lakes, canals, or seasonal streams within the Project area. SMUD will submit a water-quality monitoring report to the ENF for the year samples were taken. The report will document where, when, and how water samples were collected, when they were taken in proximity to the application date, and the laboratory results of those samples. Sampling, analysis, and reporting will follow the Water Quality Monitoring Plan in Appendix E. Results of each year’s monitoring will be discussed at the annual meeting between SMUD and the Forest Service. In consultation with the Forest Service, application methods and/or stream buffers may be adjusted. Following one year of monitoring for each herbicide with no positive detections, there will be no further Water Quality Monitoring unless a new herbicide is added to the list or there are positive detections of herbicides in surface waters.

4.0 REVEGETATION

4.1 CONDITIONS FOR REVEGETATION

Surveys have not identified any areas needing revegetation. If areas are subsequently identified, revegetation associated with the VIWMP will be directed to small areas less than 0.25 acre. Any revegetation or restoration efforts requiring action on areas greater than 0.25 acre of continuous land will not be performed under this VIWMP. These larger efforts (greater than 0.25 acre) will be addressed in separate and site-specific restoration planning documents that will be reviewed by the Forest Service or BLM, per all applicable FERC license conditions, prior to implementation. Areas subject to revegetation under the VIWMP include, but are not limited to, the following:

- areas within the UARP boundary that are subject to O&M, such as erosion control, minor site improvements, and general maintenance; and
- areas where invasive species have been removed through IVM and passive revegetation is deemed insufficient.

  Once a potential revegetation site has been identified, an evaluation of the area will be performed to determine whether and when actions should occur. The decision to proceed with revegetation will be based on several criteria. First, the amount of usual disturbance is minimal enough to reasonably allow for revegetation success. Then, if two or more of the following conditions are met, SMUD will proceed with revegetation planning and implementation as described below in Section 4.2.
  - Native vegetation cover is less than or equal to 30 percent of the surface area of the site, when compared to similar sites on adjacent, undisturbed areas.
  - Erosion is evident or there is a high potential for site degradation from erosion; or
  - Passive revegetation from surrounding native communities is unlikely due to the following:
    i. Slow rate of propagation and growth of adjacent native species;
    ii. Little or no evidence of successful reproduction of adjacent native species;
    iii. Low composition or cover of adjacent native species;
    iv. High percentage of non-native species nearby;
    v. Continuous disturbance in adjacent areas;
    vi. A natural change in native species composition between the proposed site and surrounding areas; and
    vii. Soil compaction.

If none or only one of the criteria are met, then the site will be monitored annually for a minimum of 3 years. If conditions degrade within the 3-year period, the site will be reevaluated in consultation with the Forest Service or BLM. If conditions remain unchanged, additional annual monitoring may be warranted. No action will be undertaken for sites that show improved conditions or passive revegetation within the 3-year monitoring period.

For sites that do not require revegetation, erosion control measures will still be employed. These include the use of weed-free straw mulch (state certified, as available), certified weed-free straw wattles (100% natural fiber, loose-weave design as available), and/or silt fencing.

4.2 REVEGETATION METHODS

SMUD will collect the following information prior to revegetation:

- Location and general site conditions, such as general vegetation community, slope, terrain, shade, land use, access, and proximity to known sensitive biological resources;
- Summary of invasive plant occurrences in the immediate vicinity; and,
- The composition and density of native species.

SMUD will provide this information to the ENF and/or BLM and consult with an ENF or BLM botanist to determine the appropriate seed mix, which will consist of readily available species. Minor site preparation methods, like raking, tilling/ripping soil, will be employed at compacted sites to improve seed bed if necessary. Culturally important plants will be used, as appropriate and feasible, for revegetation activities, per FERC license Condition No. 39. Two seeding techniques may be used for revegetation: hydro-seeding and hand broadcasting. Hydro-seeding will be employed in larger areas if an appropriate hydro-seed mix is available (i.e., if it is approved by ENF). SMUD will use non-toxic binders and will submit any hydro-seeding mix to the ENF or BLM for approval. Hand broadcasting will be used as needed for more focused applications where hydro-seeding cannot be employed. When hand broadcasting is used, a light layer of mulch (certified weed-free straw) will be used to protect the soil and to provide additional soil moisture to facilitate germination. Follow-up effectiveness monitoring and success criteria for such revegetation sites is described in Section 3.3.

5.0 HUMAN AND RESOURCE PROTECTION MEASURES

Protection measures that will be employed by SMUD to minimize potential impacts to natural resources and human health and safety are provided in this section, including in the tables below. These protection measures were derived from several sources, including the Forest Service polices contained in the Region Five Water Quality Management Handbook, the National Best Management Practices for Water Quality Management on National Forest System Lands (USFS 2012), and the Human Health Risk Assessment (Appendix A of VIWMP). SMUD's Vegetation Manager, along with SMUD's PCA and PCO, will be responsible for ensuring the protection measures are employed in all situations in the UARP. A checklist will be developed using the protection measures in this document, and this checklist will be completed prior to each vegetation management project.

Appendix F includes the Terrestrial and Aquatic Wildlife Biological Evaluation (BE)/Biological Assessment (BA), and Appendix G includes a Botanical Resources BE. These reports provide detailed analyses of the potential impacts from implementation of the VIWMP, and the following BMPs and resource protection measures are designed to avoid impacts to special-status species and sensitive resources.

5.1 ANNUAL EMPLOYEE EDUCATION AND AWARENESS TRAINING

SMUD currently conducts annual employee education and awareness training to ensure all personnel are appropriately informed about environmental protection measures that are requirements of O&M activities within the UARP Project Boundary under the FERC license (FERC 2101). In addition to the existing training, SMUD will conduct (with the assistance of experts from the Forest Service and other stakeholders as feasible and appropriate) annual training specifically related to the VIWMP for personnel directly involved in implementing this VIWMP. Training will include (at minimum) the following:

- a general overview of VIWMP techniques to be performed in the upcoming year and any special constraints;
- brief life history review and identification guidance for special-status and invasive species;
- occurrence information for known sensitive biological resources (i.e., habitat, Protected Activity Centers [PACs], and special status plants and wildlife, such as Valley Elderberry Longhorn Beetle [VELB]) within the vicinity of IVM to be collected as part of surveys performed in the upcoming year;
- Avoidance and Minimization Measure protocols; and
- reporting procedures and requirements.

5.2 WATER QUALITY PROTECTION MEASURES

Best management practices (BMPs) are an important part of this program. Stream buffers were reviewed and modified, following the Sierra Nevada Framework (U.S. Department of Agriculture [USDA] 2001, 2004). The United States Forest Service National Core BMPs apply Nationwide as water quality protection measures. The following Regional BMPs are non-point source pollution control measures that were developed and documented cooperatively between the California State Water Quality Control Board and the U.S. Forest Service (USFS). Applicable BMPs and their objectives, as described in the “Water Quality Management for Forest System Lands in California, Best Management Practices” (USDA 2012), are listed in Table 4.

Table 4 Water Quality Best Management Practices (USFS National Core and Regional BMPs)

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
BMP-1	In general, removal of riparian vegetation will be kept to a minimum to the greatest extent possible. Riparian vegetation known to support special-status wildlife species that interferes with SMUD facilities will be removed or treated per limiting operating periods (i.e., outside the nesting season of an avian species) or under direct species-specific mitigation as outlined in the FERC license or as requested by project stakeholders.	Chem-3	--
BMP-2	When conducting an IVM assessment, consider all potential treatment methods, and assess the potential wildlife and habitat impacts of each (SMUD's vegetation management team will review maps of special-status species during the planning stage of vegetation management projects).	Chem-1, Veg-1	--
BMP-3	Surveys for special-status plant and invasive weed populations will be completed every five years and communicated to SMUD managers and agency stakeholders. Prior to management, special-status plants will be flagged and chemical treatments will be avoided using the agreed upon buffers (see Appendix F). This measure is repeated in Table 6, PM-8.	Chem-1	--
BMP-4	Annual employee awareness training (see Section 5.1) shall be implemented to ensure that all personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources and invasive species considerations.	Chem-1	
BMP-5	SMUD IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance, as well as removal of shade and native vegetation or topsoil. This measure is repeated in Table 6, PM-16.	Chem-1, Veg-1, Veg-8	
BMP-6	SMUD will revegetate areas as appropriate and as soon as possible to prevent erosion and to reduce the chance for unwanted invasive species.	Veg-2, Veg-8	5.4
BMP-7	To avoid or minimize unnecessary or excessive vegetation disturbance, SMUD will remove vegetation from swales, ditches, and shoulders, and cut and fill slopes only when it impedes adequate drainage, or vehicle passage, or when it obstructs necessary sight distance.	Road-4	--
BMP-8	SMUD will use low-ground-pressure equipment to minimize soil disturbance. SMUD will conduct mechanical activities when soil conditions are acceptable to reduce compaction, soil displacement, and erosion.	Veg-8	5.6
BMP-9	SMUD will complete Water Quality (WQ) monitoring for specific herbicides within perennial waters according to the Water Quality	Chem-6	5.9

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
	Monitoring Plan (see Appendix E) in order to determine if there have been any offsite movement of herbicides into surface waters.		
BMP-10	Follow-up Monitoring: SMUD will keep detailed records and perform follow-up monitoring for effectiveness and undesirable impacts.	Chem-6	5.9
BMP-11	Mechanical equipment will be restricted to slopes generally less than 35 percent; when within Riparian Conservation Areas (RCAs); mechanical treatments will be minimized on moderate slopes (15-30 percent) and restricted to slopes less than 30 percent. Newer equipment may be used on slopes up to 40% in transmission ROW (e.g., mastication). This would be on transmission ROW using tracked masticators. May need to be less for RCAs depending on slope stability and soils.	Veg-1, Veg-2, Veg-8	5.2
BMP-12	Vehicles will not be allowed within Aquatic Management Zones (AMZ) areas; only hand-operated equipment will be used within 50 feet of meadows, springs, and wetlands. AMZ's in the field will be marked. Vehicles will not be allowed within 100 feet of perennial or intermittent streams or within 50 feet of meadows, springs, and wetlands; only hand operated equipment will be used in the these areas.	Plan-3, Veg-2, Veg-3, Veg-8	5.3
BMP-13	Trees will be retained in riparian areas to the maximum extent possible to retain canopy cover.	Veg-3	--
BMP-14	SMUD PCOs will apply chemical treatments according to label directions, prescriptions, and all applicable laws and regulations governing the use of pesticides; pesticide label requirements will be followed. A licensed Pest Control Advisor (PCA) will be consulted in the planning and execution of all herbicide applications. Individuals with a Qualified Applicator's License or Certificate (QAL or QAC) from the California Department of Pesticide Regulation (Cal DPR) will oversee applications on the ground.	Chem-1, Chem-2, Chem-5	5.8
BMP-15	When using herbicides, SMUD PCO's will use the most specifically targeted application method that can effectively achieve program goals.	Chem-1	--
BMP-16	SMUD will implement the Pesticide Spill Contingency Plan (see Appendix H) to reduce contamination of water by accidental pesticide spills.	Chem-2	5.10
BMP-17	PCOs will follow safe procedures for transporting, mixing and loading herbicides by instituting the following measures: PCOs will limit the amount of herbicide that is transported in a vehicle to that which could be batched and used in a single day. Typically that would be no more than enough to create 200 gallons of final mix, which will be mixed in batches as needed, not all at once. PCOs will transport herbicides in a spill-proof, non-food container if they are not using the original container. PCOs will mix and load herbicides only in pre-designated areas,	Chem-1, Chem-2, Chem-5	5.8 5.10 5.11

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
	outside of RCAs. They will select areas where a potential spill would be most easy to contain and would have the least impact. PCOs will add a marker dye to the herbicide mixture so workers can readily see any spills. Dye also helps workers see any drift or mis-application to non-target plants, and it helps them monitor where they have sprayed previously. PCOs will carry a spill kit to contain and remove any spills immediately and will train crews on procedures for doing so. PCOs will carry soap and water to wash spills off of hands, feet and legs, and bring extra gloves. PCOs will triple-rinse emptied herbicide containers into the sprayer at the time of use and utilize these spray rinses in areas allowed by the herbicide label.		
BMP-18	PCA's will consider the effective timing of the herbicide and application technique to be used based on its “mode of action” and the target plant’s annual growth cycle. Efficacy, efficiency, and environmental constraints will dictate treatments. The most effective treatments result in the least amount of entries. Anything above 85% control is considered commercially acceptable.	Chem-1	--
BMP-19	SMUD PCA's will restrict chemical treatments to areas outside appropriate buffers RCAs, wetlands, and waters. They will map or flag waters, wetlands, and riparian areas. No mixing or loading will occur within 200 feet of any stream, wetland, or other sensitive riparian or aquatic site.	Chem-3	5.12
BMP-20	Measures to control pesticide drift during spray application will include, but are not limited to: • Using ground-based application equipment; • Using spray nozzle that produces 350 micron or greater droplets; • Using nozzle pressures below 25 PSI on backpacks; • Using spray nozzles no higher than 2 feet from the ground; • Using ground application directed away from non-target vegetation. Drift reduction nozzles may be employed where warranted.	Chem-3	5.13
BMP-21	Chemical treatments shall occur when weather and soil conditions are favorable. Application can proceed if weather conditions appear favorable, which is when there is a 30% or less chance of rain on the day of application (according to NOAA); if precipitation is predicted within 48 hours, the amount predicted shall be no more than ¼- inch; sustained winds are less than 5 MPH; and rain does not appear likely at the time of application.	Chem-1	5.13
BMP-22	A licensed PCA will prepare the Pesticide Use Recommendations based on site-specific conditions, including soils, slopes, and vegetation composition.	Chem-1	5.8
BMP-23	PCA herbicide applications will comply with product label directions and applicable legal requirements. Herbicide applications will treat the minimum area necessary to meet site objectives.	Chem-1, Chem-2	5.8

	Water Quality Best Management Practices	USFS – National Core BMPs	USFS – Regional BMPs
BMP-24	PCO's will conduct as few treatments as possible, since the act of entering the area to be treated may itself have the most significant potential for impacts to wildlife. Treating an area once with an herbicide with a slightly higher potential for impact may have less overall impact than multiple applications with a lower-impact herbicide.	Chem-1	--
BMP-25	Mixing and loading of chemicals will not occur in areas with a ditch connection to aquatic features.	Chem-3	
BMP-26	Water drafting for use in VIWMP implementation will not occur on Forest Service lands.	Chem-5	
BMP-27	No storage of fuels or refuelling will occur within RCAs unless there are no other alternatives and exceptions have been agreed to advance by the Forest Service. (applicable direction WQMH BMP 2-11 and SNFPA S&G #99)		

Table 5 provides herbicide application buffer zones designed to protect Threatened, Endangered, Sensitive (TES) aquatic wildlife species (e.g., fish and amphibians) and water quality. These buffer zones were developed based on the analysis in the Biological Evaluations prepared for the VIWMP and by reviewing the following, as recommended in the National Best Management Practices for Water Quality Management on National Forest System Lands (USFS 2012):

- the characteristics of each chemical to be used (e.g., persistence, mobility, toxicity profile, and bioaccumulation potential);
- application method (e.g., type of equipment, spray pattern, droplet size, application height);
- the designated uses of water, adjacent land uses, expected rainfall, terrain, slope, soils, and geology; and
- experience in similar projects.

Table 5. Watercourse Buffers[1]

Herbicide[2]	Constructed Water Conveyance and Storage Structures[3]	Natural Watercourses[4]
Aminopyralid	25 feet	100 feet
Chlorsulfuron	25 feet	100 feet
Clopyralid	25 feet	100 feet
Glyphosate (less toxic/aquatic formulations)	10 feet	50 feet
Imazapyr	10 feet	50 feet

Sulfometuron methyl	25 feet	100 feet
Triclopyr (BEE)	300 feet	300 feet
Triclopyr (TEA)	10 feet	100 feet

[1] Buffer distances for aquatic features should be measured from the edge of the stream channel, or the edge of the special aquatic feature, or the extent of the wetted area, whichever is greater.
[2] Herbicide application within 300 feet of natural water courses will be cut-stump, hack and squirt, or direct foliar methods only.
[3] Man-made water conveyance or storage structures directly associated with engineered Project facilities, such as dams, groins, spillways, canals, flumes, weirs, etc.
[4] Natural watercourses are perennial or seasonal streams, wetlands, or intermittent channels.

5.3 WORKER AND PUBLIC SAFETY

Worker and public safety is critically important when applying herbicides and is regulated by the State of California. Appendix A includes a Human Health and Risk Assessment of the risk of herbicides to workers and the public. Site-specific protection measures are described in the table below. Appendix H includes the Pesticide Spill Prevention, Control and Countermeasure Plan for the UARP.

5.4 PROJECT-SPECIFIC RESOURCE CONSIDERATIONS

A list of project-specific resource protection measures, designed to avoid adverse effects to humans and sensitive resources resulting from project implementation, is provided in Table 6. Many of the BMPs listed above in Tables 4 and 5 also reduce the risks to humans and other biological resources.

Table 6. Human and Resource Protection Measures (PM)

General Biological Resources	
PM-1	A biologist or PCA shall conduct a pre-activity survey and flag all wetlands and associated wetland vegetation for avoidance.
PM-2	SMUD will implement annual employee awareness training (see Section 5.1) to ensure that all personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources and invasive species considerations.
PM-3	SMUD Environmental Management Staff will periodically visit some application sites to ensure resource protection measures are being followed.
PM-5	Immediately notify agencies if occurrences of special-status plants or wildlife species are detected prior to, or during, ongoing construction, operation, or maintenance of the Project (USFWS 2009).
PM-6	Each year, in compliance with USFS 4(e) Condition 38, SMUD will consult with USFS, USFWS, and CDFW to review the current list of special-status plant and wildlife species (species that are Federal Endangered or Threatened, USFS/BLM Sensitive, or on Eldorado National Forest Watch Lists) that might occur on National Forest System or BLM lands in the Project Area directly affected by Project operations.
PM-7	Sensitive resource protection priorities and strategies are expected to change over the term of the license based on climate conditions, listing/decline or delisting/recovery of individual

	species, and the potential discovery of new resources within the UARP boundary. Consequently, sensitive resource protection will be part of the yearly discussion with stakeholders during the annual review period. Protection strategies will be updated based on stakeholder recommendations, will be agreed upon by the group, and will be implemented by SMUD, as appropriate and feasible.
Botanical Resources	
PM-8	Surveys for special-status plant and invasive weed populations will be completed every five years and communicated to SMUD vegetation managers and agency stakeholders.
PM-9	SMUD will consult annually with the ENF and BLM to review the most current list of special-status plant species and invasive weeds that might occur on National Forest System or BLM lands in the Project Area directly affected by Project operations. If any previously unidentified occurrences are noted, then SMUD would manage them according to the provisions in this plan.
PM-10	Prior to herbicide or mechanical treatments, SMUD will flag and avoid occurrences of *Carex davyi, Eriogonum ovalifolium var. eximium, Githopsis pulchella ssp serpentinicola. Glyceria grandis, Streptanthus longisiliquus, and Wyethia reticulata*. If additional watch list species are discovered within the UARP appropriate protections would be developed as necessary. The herbicide exclusion buffers described in Table 7 will be applied unless exceptions are approved by Forest Botanist. Flagged watchlist plant populations will be avoided during mechanical treatments as well unless approved by Forest Botanist.
PM-11	Prior to herbicide treatments or mechanical treatments, SMUD will flag occurrences of ENF/BLM-sensitive plant species, except in the case of select roadside occurrences. The herbicide exclusion buffers described in Table 7 will be applied unless exceptions for buffer distances are approved by USFS or BLM botanist. Flagged sensitive plant populations will be avoided during mechanical treatments as well unless exceptions are approved by USFS or BLM botanist.
PM-12	SMUD will invite a USFS and/or BLM botanist to visit sites where treatment has occurred near special status plants to see if resource protection measures were effective.
PM-13	SMUD will ensure the location of lava cap sites is known to any personnel performing IVM within the UARP boundary and protection buffers are employed when IVM activities occur in the vicinity of lava caps. If IVM activities must be implemented within the protection buffer, then species' occurrences will be clearly marked at the site prior to the onset of activities and only manual treatment methods will be utilized that will also be reviewed by the Forest Service during the annual meeting
PM-14	The license and BO consider three of the federally-listed gabbro species that may occur within the UARP boundary: Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron californicum ssp. decumbens*), and Layne's butterweed (*Senecio layneae*). In accordance with the BO, SMUD will consult with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve. Treatment will be restricted to manual methods only (no chemical use) when managing vegetation in the transmission ROW within the preserve. If IVM activities must be implemented within the protection buffer, then species' occurrences will be clearly marked at the site prior to the onset of activities, and only manual treatment methods will be utilized.
Invasive Weed Prevention	
PM-15	Annual effectiveness monitoring (see Section 3.2) will include monitoring of invasive weed infestations that are targeted for control or eradication. During the annual monitoring of

	facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments are needed. Where past treatments have successfully controlled or eradicated an infestation SMUD will continue to monitor the infestation annually until it is determined that treatment objectives have been met (based on expected seed bank longevity of the targeted species).
PM-16	New populations of invasive weeds will be inventoried and mapped during regularly described monitoring, and will be subsequently incorporated into the scheduled annual treatment.
PM-17	Control methods will be determined by species, location, and season to facilitate the control of invasive plants. Where feasible, control methods will occur as part of the annual maintenance work.
PM-18	Management of invasive weeds will follow the management guidelines identified by the ENF and other stakeholders.
PM-19	IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance or removal of shade and native vegetation or topsoil.
PM-20	Equipment, Staff, and Contractors involved in IVM shall be staged and begin in non-infested areas and then will move to infested areas.
PM-21	Contractors and other staff will be required to clean vehicles and equipment prior to working on the National Forest; when moving from an infested unit to a weed-free unit, vehicles and equipment will be inspected. Vehicles will be washed by contractor at their business or at SMUD's Fresh Pond facility.
PM-22	Areas in which ground-disturbing activity has occurred, and in which there is the potential to introduce invasive weeds, will be monitored for 3 years.
PM-23	Weed-free materials, including certified weed-free straw or mulch, will be used for erosion control, with the county of origin stating the material was inspected. Local stockpiles and materials will be kept weed free with regular treatment.
PM-24	Lay-down and staging areas will be designated outside of areas infested with weeds, or the sites will be treated prior to work.
PM-25	Facility sites will be maintained to limit the introduction and spread of invasive plants; heavily used facilities will be regularly treated to prevent the spread of weeds.
PM-26	Mechanical weed trimming will not be used to manage occurrences of listed invasive weeds if those weeds have already set seeds.
PM-27	The USFS botanist will approve seed mixes used for erosion control or restoration.
Terrestrial Wildlife Resources	
Valley Elderberry Longhorn Beetle	
PM-28	Prior to conducting any vegetation disturbing actions in the Project Area under 3,000 feet elevation where elderberry may occur, SMUD shall survey the area to be disturbed for the presence of the beetle and its elderberry host plant and implement avoidance and protection measures, as per the USFWS 1999 Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 2009).
PM-29	If elderberry plants containing stems, measuring 1.0 inch or greater in diameter at ground level, are found in a treatment area, establish and maintain a minimum 100-foot buffer. Construction-related disturbance of the buffer areas will be minimized, and, following construction, any damaged area will be promptly restored. The Service must be consulted before any disturbances within the buffer area are considered (USFWS 1999).

PM-30	If removal or damage to elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level is necessary, SMUD will compensate for the loss. Compensation will occur either through transplanting the shrubs in accordance with USFWS 1999, through the establishment of a Service-approved conservation area, or through the purchase of Valley elderberry longhorn beetle credits at a Service-approved conservation bank (USFWS 2009).
Northern Goshawk	
PM-31	Prior to conducting any manual/mechanical vegetation treatments (e.g., chainsaw use or hazard tree removal) during the northern goshawk breeding season (15 February through 15 September), SMUD will consult the latest Goshawk PAC GIS database to determine if activities will occur within 0.25 miles of a PAC.
PM-32	If northern goshawk nests or PACs are identified in, or immediately adjacent to, the manual vegetation treatment, a no-disturbance buffer zone will be established around the nest site or activity center, as feasible. The width of the buffer zone, determined by a qualified biologist in coordination with CDFW and USFS, will be established such that the nest site will be adequately shielded from planned activities (e.g., by trees or natural topographic features), minimizing disturbance. No treatment activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). If a protective buffer zone is infeasible, construction will be postponed until after 15 August or until after the nestlings have fledged.
California Spotted Owl	
PM-33	Prior to conducting any manual/mechanical vegetation treatments (e.g., chainsaw use or hazard tree removal) during the California spotted owl breeding season (1 March through 15 August), SMUD will consult the latest Spotted owl PAC GIS database to determine if activities will occur within 0.25 miles of a PAC.
PM-34	If California spotted owl nests or activity centers are identified in, or immediately adjacent to, the manual vegetation treatment area, a no-disturbance buffer zone will be established around the nest site or activity center, as feasible. The width of the buffer zone, determined by a qualified biologist in coordination with CDFW and USFS, will be established such that the nest site will be adequately shielded from planned activities (e.g., by trees or natural topographic features), minimizing disturbance. No treatment activities would occur within the buffer zone. The buffer zone would be maintained until the young have fledged (as determined by a qualified biologist). If a protective buffer zone is infeasible, construction will be postponed until after 15 August or until after the nestlings have fledged.
Bald Eagle	
PM-35	If a bald eagle nest is located within 0.25-miles of mechanical vegetation treatments that may potentially indirectly disturb nesting bald eagles during the breeding season, a no-disturbance buffer will be established in accordance with National Bald Eagle Management Guidelines (USFWS 2007) to minimize visual and auditory impacts associated with human activities. The size and shape of the buffer would vary depending on the topography and other ecological characteristics surrounding the nest site.
Aquatic Wildlife Resources	
PM-36	Watercourse buffers will be implemented as outlined in Table 5 above.
PM-37	Herbicide batching will be limited to areas more than 300 feet away from surface waters.

Worker and Public Safety	
PM-38	The California Department of Pesticide Regulation (DPR 2003 and 2004) has developed a robust Worker Protection Program around regulations; SMUD and SMUD's contractor(s) applying pesticides will use this program to comply with all State and Federal regulations.
PM-39	Signage with pertinent information will be posted at points of entry to areas being sprayed. Signs will include the date of treatment, name of pesticide, and contact information. Persons responsible for the pesticide application will notify anyone at or near the application site that the site is being treated with herbicide. Public access will be prohibited until sprays are dry.
PM-40	For clopyralid, the public will be prohibited from entry until after the application has dried. Clopyralid will only be applied via spot foliar to plants less than 2 feet tall.
PM-41	Fruit-bearing plants will not be sprayed when fruit is present.
PM-42	Crews will walk around treated vegetation, not through it.
PM-43	No more than 30 gallons of herbicide formulation will be in the treatment site at any time.
Cultural Resources	
PM-44	IVM activities shall comply with policies outlined in the UARP HPMP (2008).
PM-45	SMUD will work with the USFS to identify opportunities to use culturally important plants.
Fire Safety	
PM-46	All IVM activity will comply with the Forest Service's Project Activity Level fire protection protocols.

5.5 DESIGN CRITERIA FOR SPECIAL STATUS PLANTS

As described in Table 7, herbicide exclusion buffers will be applied in the vicinity of occurrences of ENF Sensitive plant species to guard against effects from both drift and runoff. These distances are considered maximum buffers and reductions in buffers will be discussed in consultation with USFS; A USFS or BLM botanist, will determine if actual distances may be adjusted, based on species, temporal, or site-specific considerations. Methods will be used to avoid sensitive plant populations - including flagging for avoidance and seasonal treatments to occur after sensitive annual plants have set seed. For selected roadside occurrences (See Appendix G), SMUD will not flag Sensitive plant occurrences for avoidance. Flagging, buffering and avoiding treatment at these locations encourages the proliferation of invasive plants and potentially creates an unsafe situation by increasing fire danger and the chances for vehicle collisions.

Table 7. Herbicide Exclusion Buffers around ENF Sensitive Plants.

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]
Aminopyralid	200
Chlorosulfuron	100
Clopyralid	50
Glyphosate	50
Imazapyr	100
Sulfometuron methyl	100
Triclopyr BEE	200
Triclopyr TEA	50

[1] Measured from exterior edge of ENF Sensitive plant occurrence; exceptions for buffer distances can be made when approved by USFS or BLM botanist.

5.6 AQUATIC INVASIVE WEEDS

FERC license USFS 4(e) Condition No. 39 and SWRCB, WQC Certification Condition 26 require that SMUD include an adaptive management element to implement methods for prevention of aquatic invasive weeds, as appropriate, in order to protect native aquatic species. These actions may include, but are not limited to, the following:

1. public education and signing of public boat access,
2. preparation of an Aquatic Plant Management Plan approved by the Forest Service, and in consultation with other agencies, and
3. boat cleaning stations at boat ramps for the removal of aquatic invasive weeds.

There are currently no known aquatic weed infestations within the UARP boundary. SMUD currently monitors the major recreational reservoirs and one other reservoir (Union Valley, Ice House, Robbs Peak and Loon Lake) for other aquatic invasive invertebrates periodically (monthly) during the recreation season. SMUD will perform presence/absence surveys for aquatic weed species of concern, in conjunction with the existing invertebrate monitoring effort the sites above. The observations will be recorded on datasheets developed for this monitoring effort. If the presence of an invasive aquatic weed is confirmed, SMUD will consult with stakeholders to determine follow-up actions. Additionally, SMUD will provide new/updated signage (using agency-standard signs) related to aquatic weeds at popular boat launch sites within the UARP boundary. Should conditions change, SMUD will consider implementing additional aquatic weed prevention strategies, as recommended by the stakeholders.

5.7 GABBRO SOILS ENDEMIC PLANTS OF THE PINE HILL PRESERVE

Gabbro plants are most often associated with the Rescue soil series, which is well-drained and underlain by gabbrodiorite (granular igneous) rocks, on the Pine Hill formation in western El Dorado County. A Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills includes management objectives for six plant species that occur exclusively or primarily on gabbro soils of the Pine Hill formation in chaparral and woodland communities (USFWS 2002). The six species are state or federally protected and include Stebbins' morning-glory (*Calystegia stebbinsii*), Pine Hill ceanothus (*Ceanothus roderickii*), Pine Hill flannelbush (*Fremontodendron californicum ssp. decumbens*), El Dorado bedstraw (*Galium californicum* spp. *sierrae*), Layne's butterweed (*Senecio layneae*), and El Dorado mule-ears (*Wyethia reticulata*).

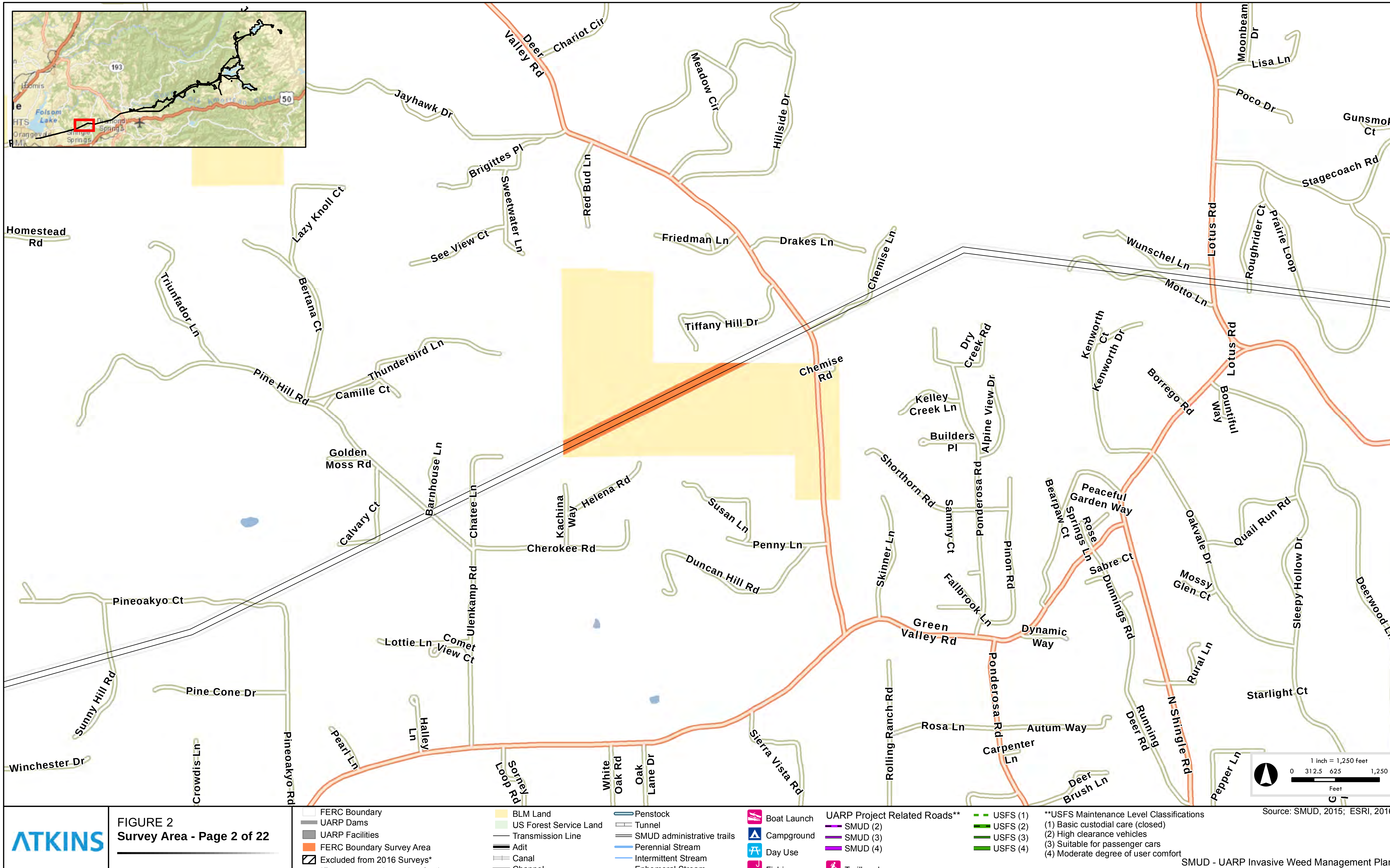
The license and BO consider three of the federally-listed gabbro species that may occur within the UARP boundary:

1. The endangered Pine Hill ceanothus;
2. The endangered Pine Hill flannelbush; and
3. The threatened Layne's butterweed.

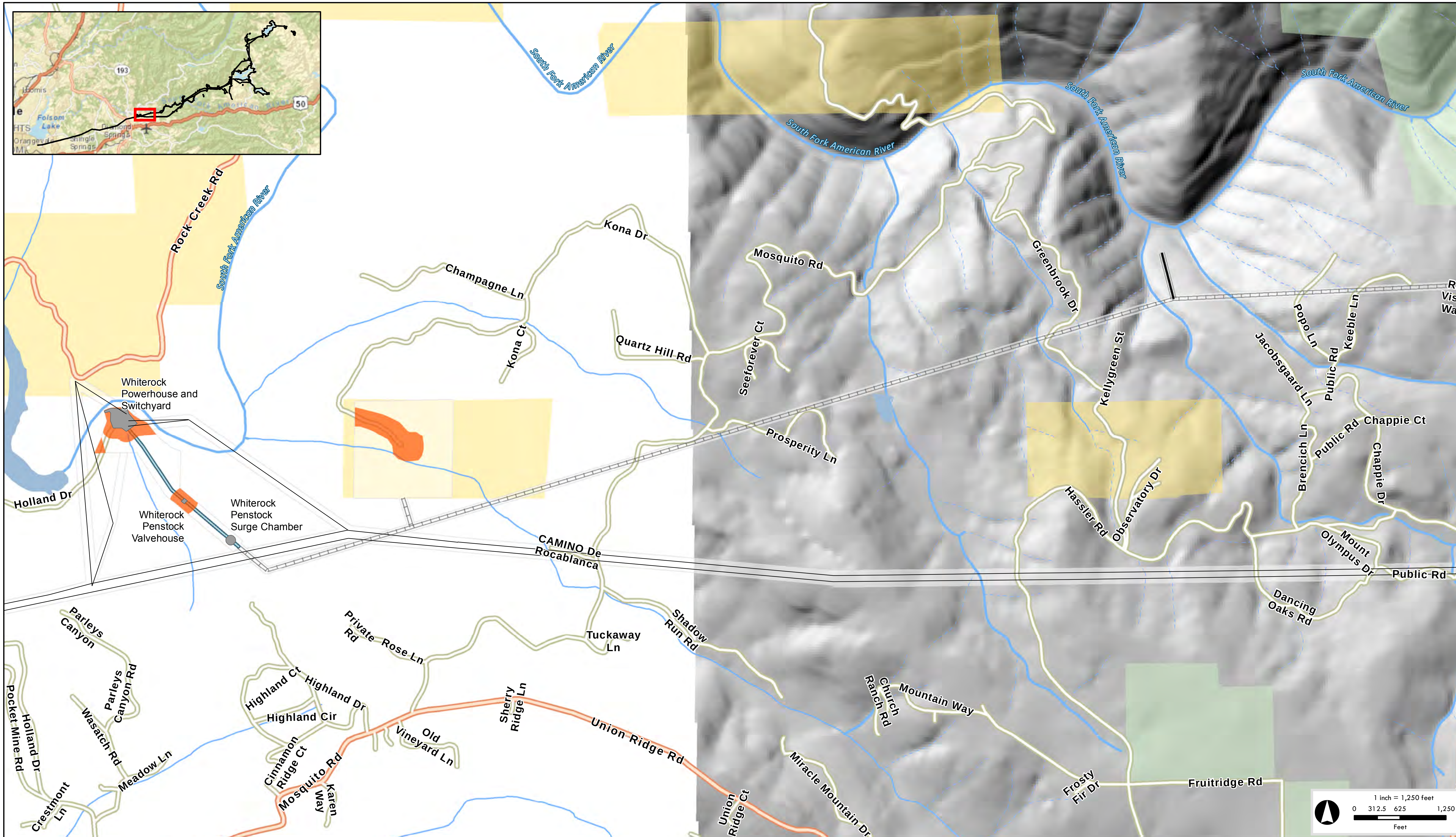
The USFWS determined that O&M of UARP facilities under the license is not likely to jeopardize the continued existence of these three species.

SMUD will ensure the location of gabbro species is known to any personnel performing vegetation management within the UARP boundary and protection buffers are employed when IVM activities occur in the vicinity. In accordance with the BO, SMUD will consult with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve. Treatment will be restricted to manual methods only (no chemical use) when managing vegetation in the transmission ROW within the preserve. If IVM activities must be implemented within the protection buffer, then species' occurrences will be clearly marked at the site prior to the onset of activities and only manual treatment methods will be utilized.

Figure 2b. 2016 Botanical Surveys



1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 3 of 22

- FERC Boundary
- UARP Dams
- UARP Facilities
- FERC Boundary Survey Area
- Excluded from 2016 Surveys*
- *Recent survey data exists for these areas
- BLM Land
- US Forest Service Land
- Transmission Line
- Adit
- Canal
- Channel
- Penstock
- Tunnel
- SMUD administrative trails
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Boat Launch
- Campground
- Day Use
- Fishing
- Trailhead

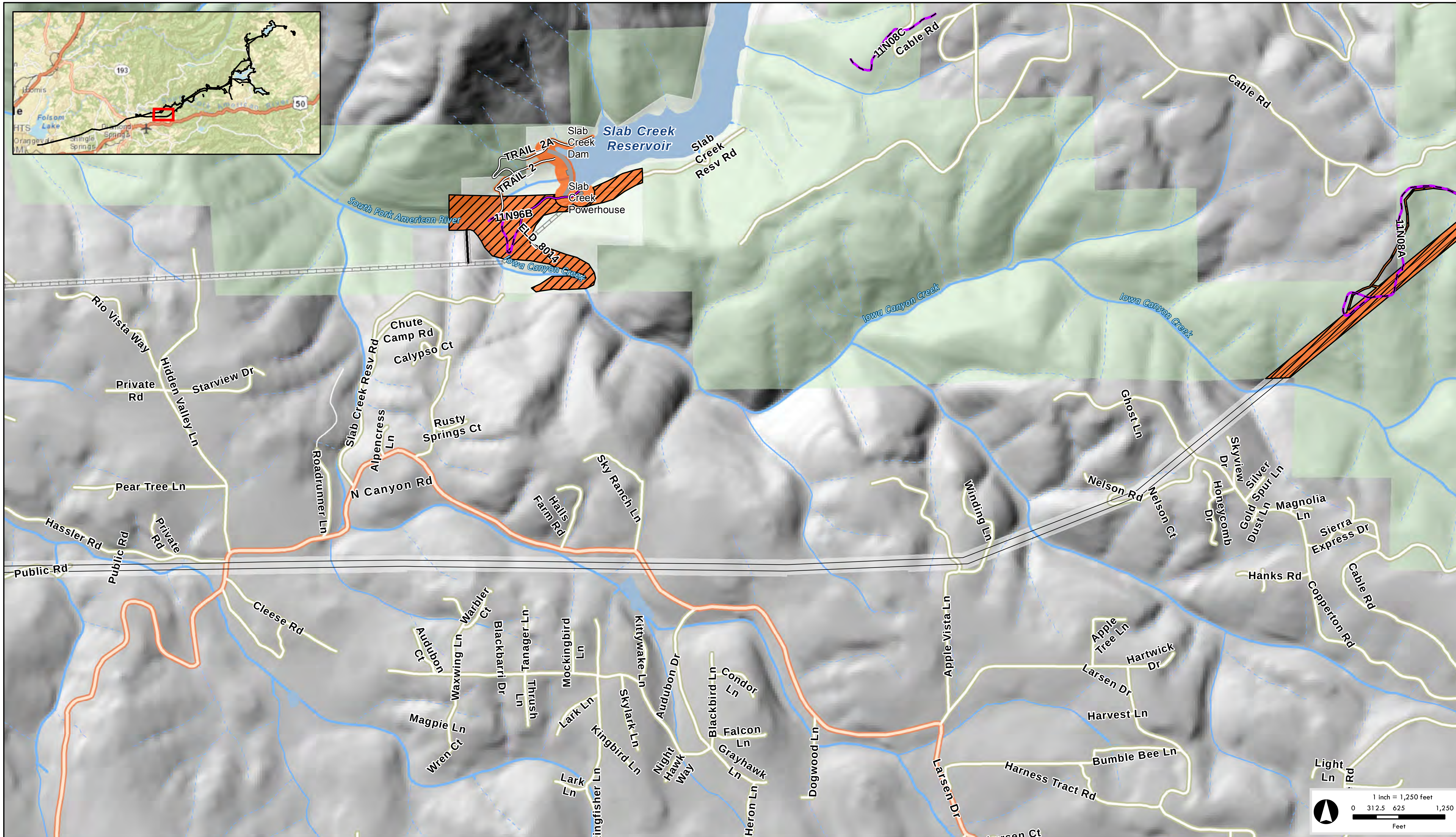
UARP Project Related Roads**
- SMUD (2)
- SMUD (3)
- SMUD (4)
- USFS (1)
- USFS (2)
- USFS (3)
- USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 4 of 22

- FERC Boundary
- UARP Dams
- UARP Facilities
- FERC Boundary Survey Area
- Excluded from 2016 Surveys*
- *Recent survey data exists for these areas
- BLM Land
- US Forest Service Land
- Transmission Line
- Adit
- Canal
- Channel
- Penstock
- Tunnel
- SMUD administrative trails
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Boat Launch
- Campground
- Day Use
- Fishing
- Trailhead

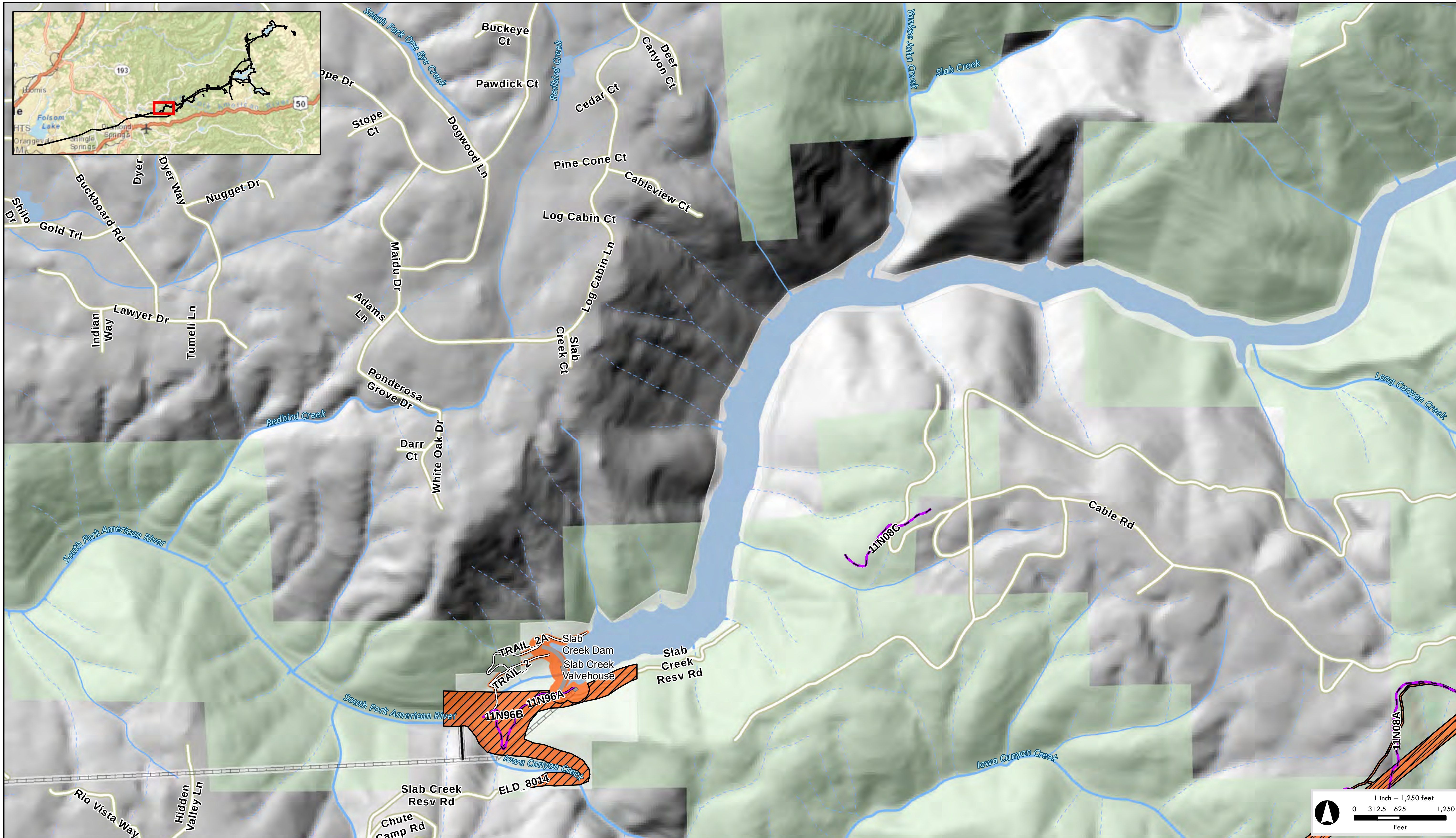
UARP Project Related Roads**
- SMUD (2)
- SMUD (3)
- SMUD (4)
- USFS (1)
- USFS (2)
- USFS (3)
- USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 5 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

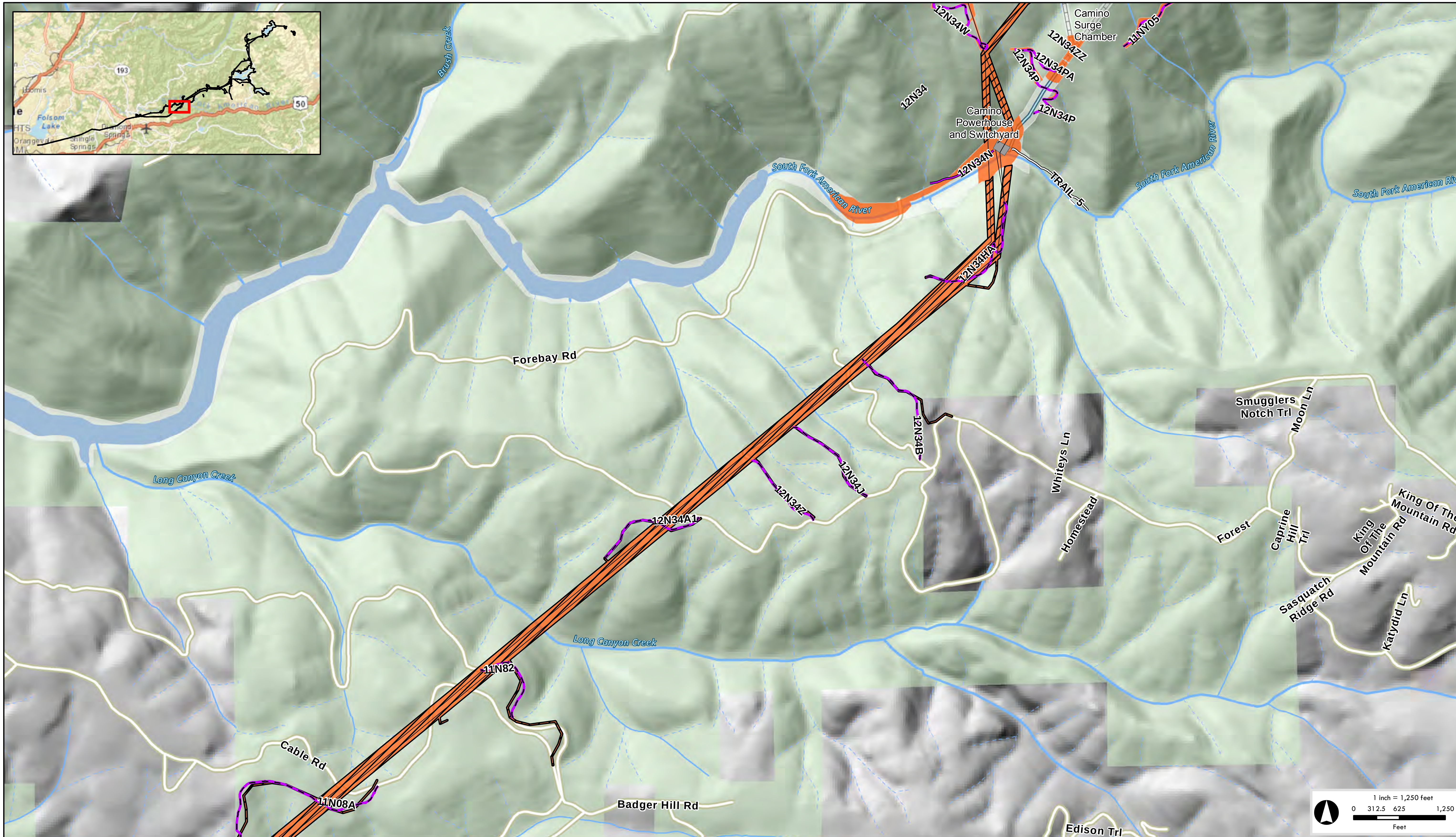
UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan



ATKINS

FIGURE 2
Survey Area - Page 6 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

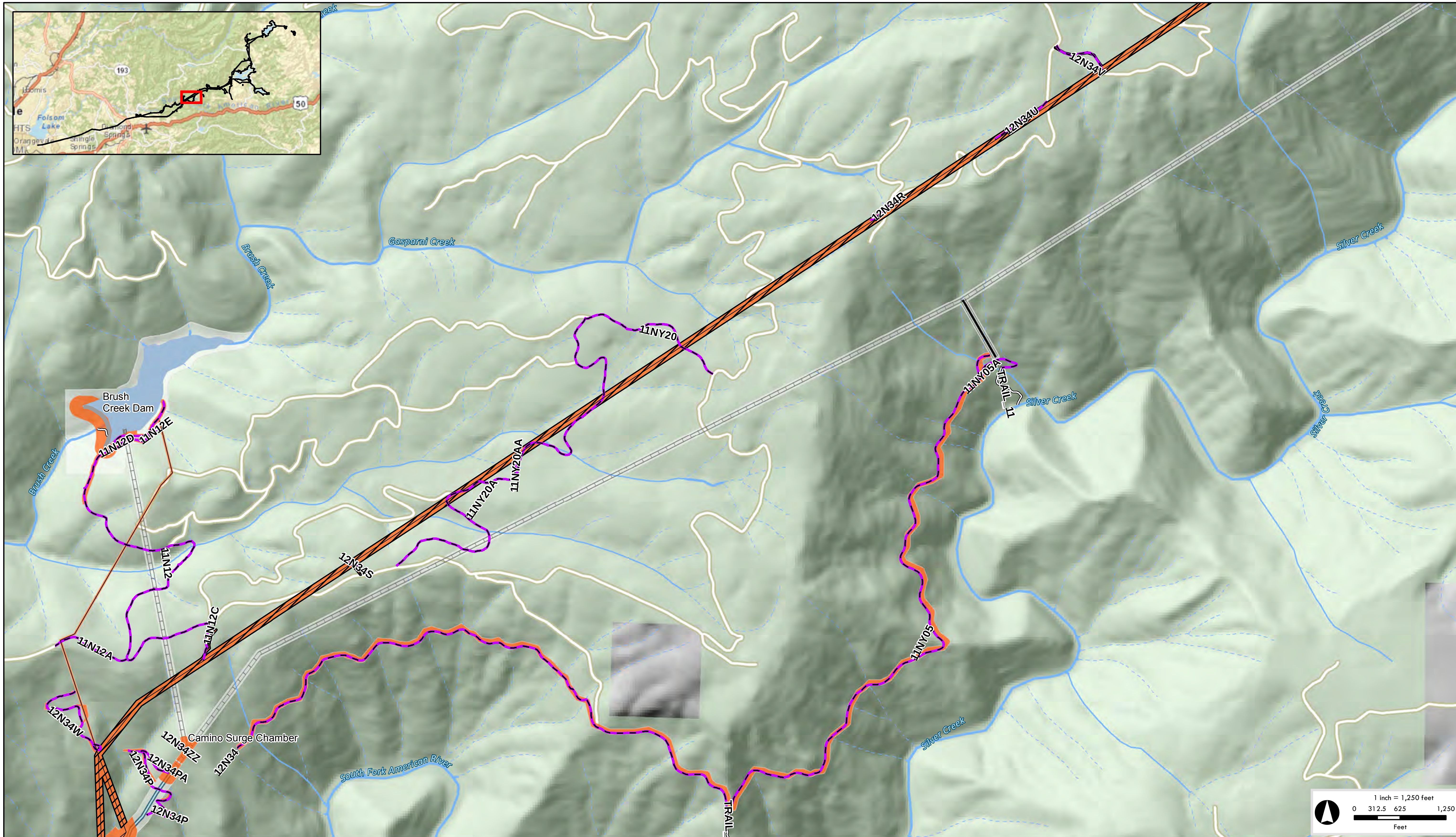
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 7 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

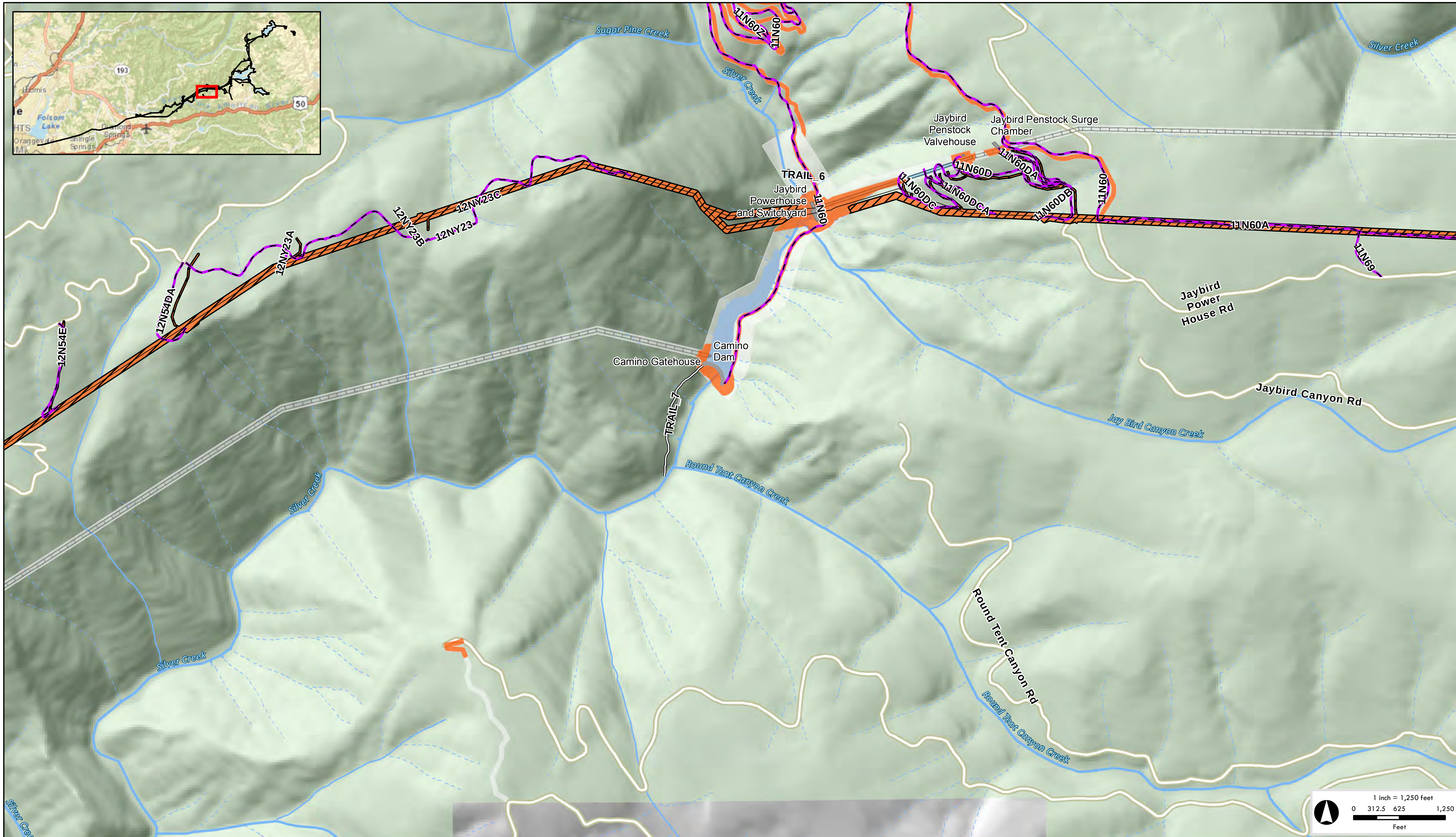
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 8 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

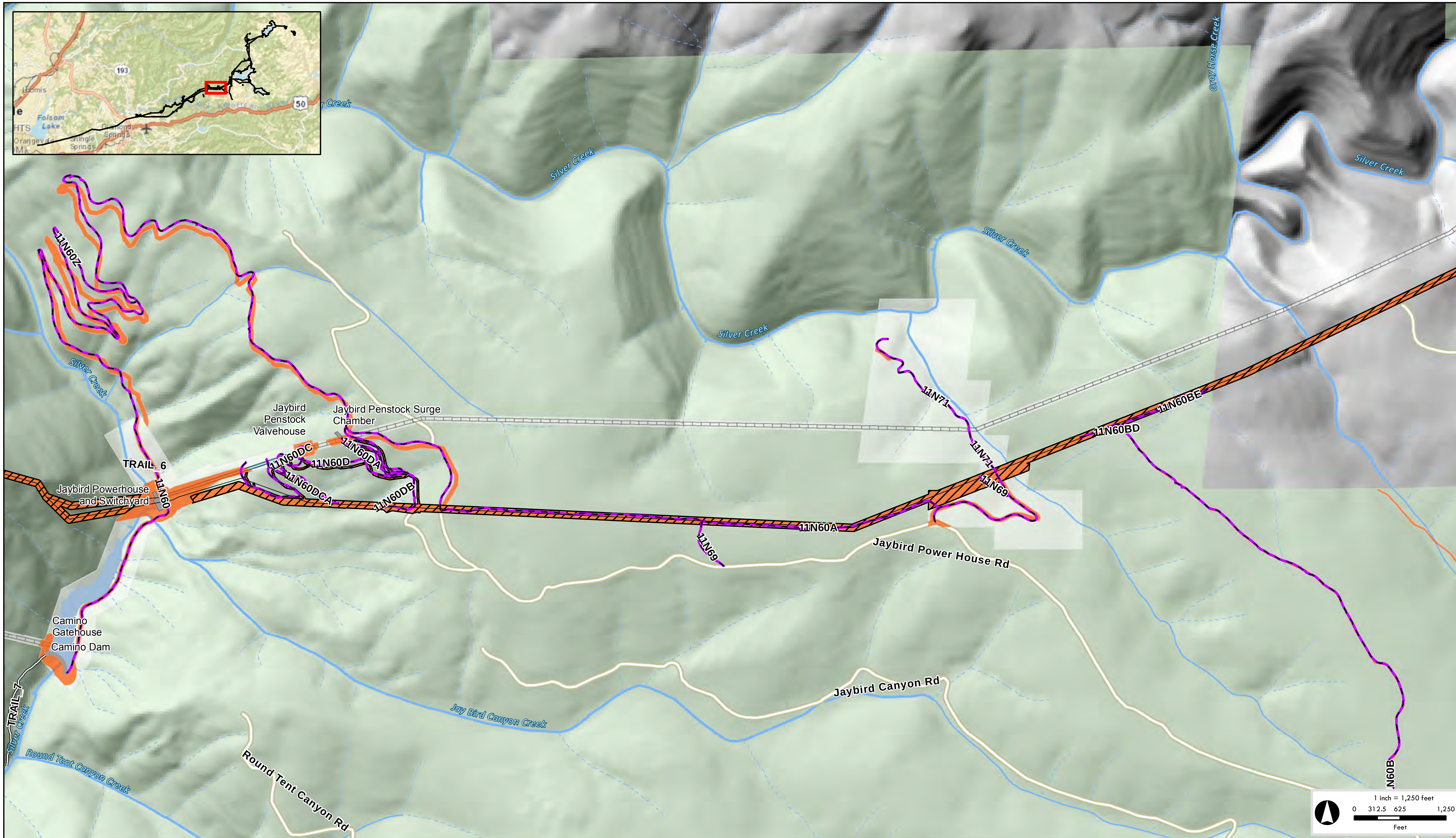
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 9 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

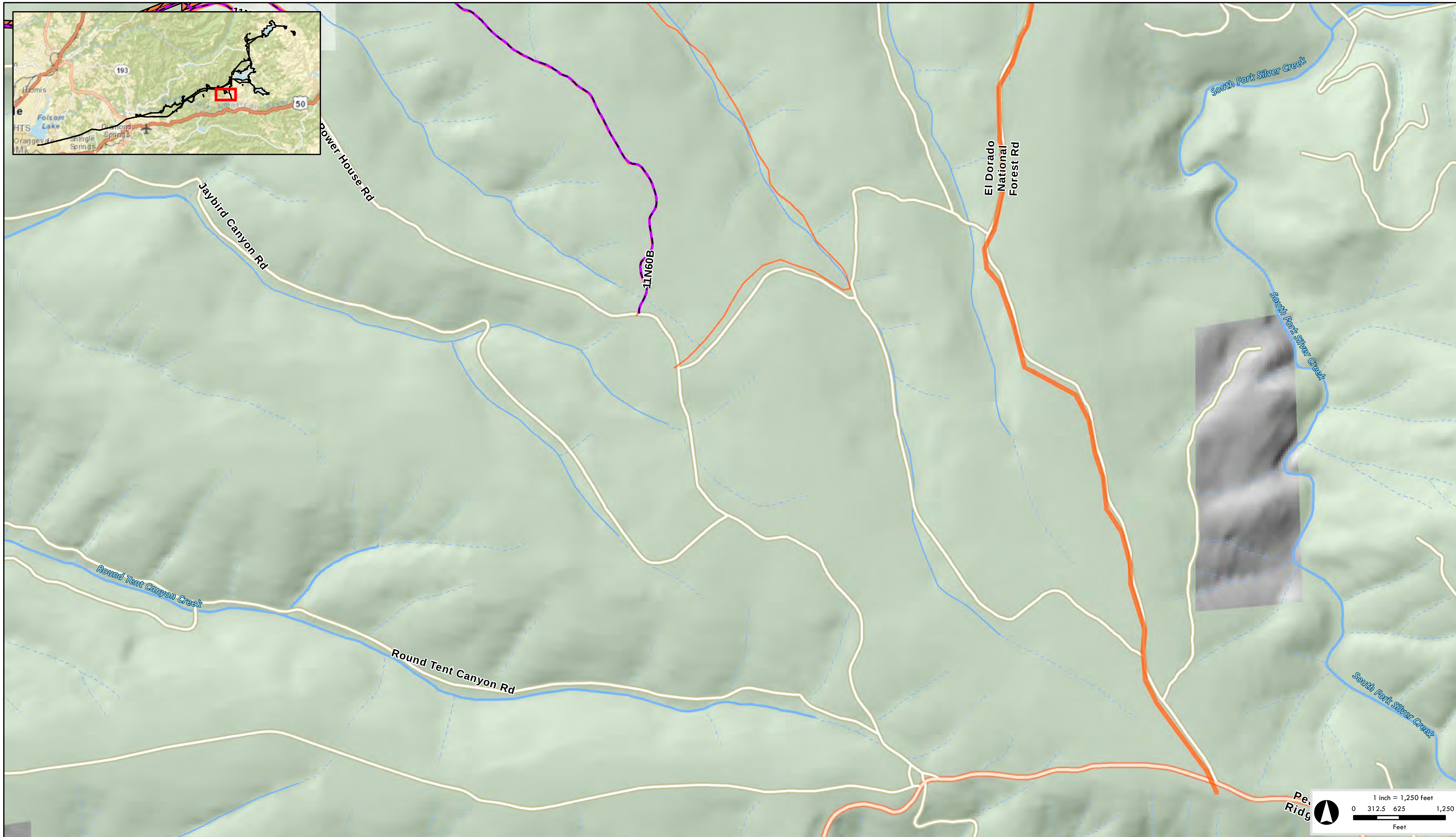
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



Source: SMUD, 2015; ESRI, 2016

ATKINS

FIGURE 2
Survey Area - Page 10 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

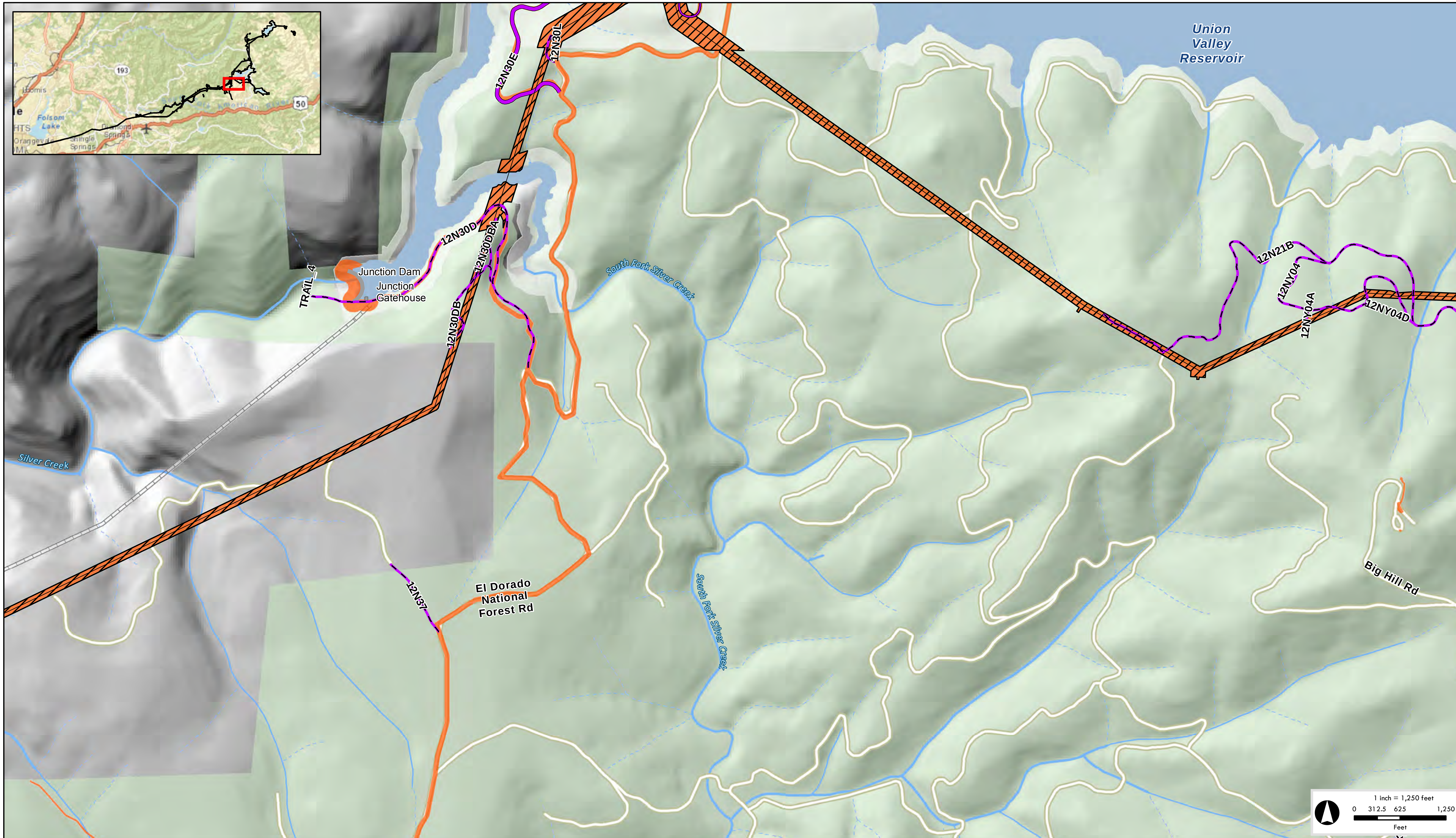
Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

SMUD - UARP Invasive Weed Management Plan



ATKINS

FIGURE 2
Survey Area - Page 11 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

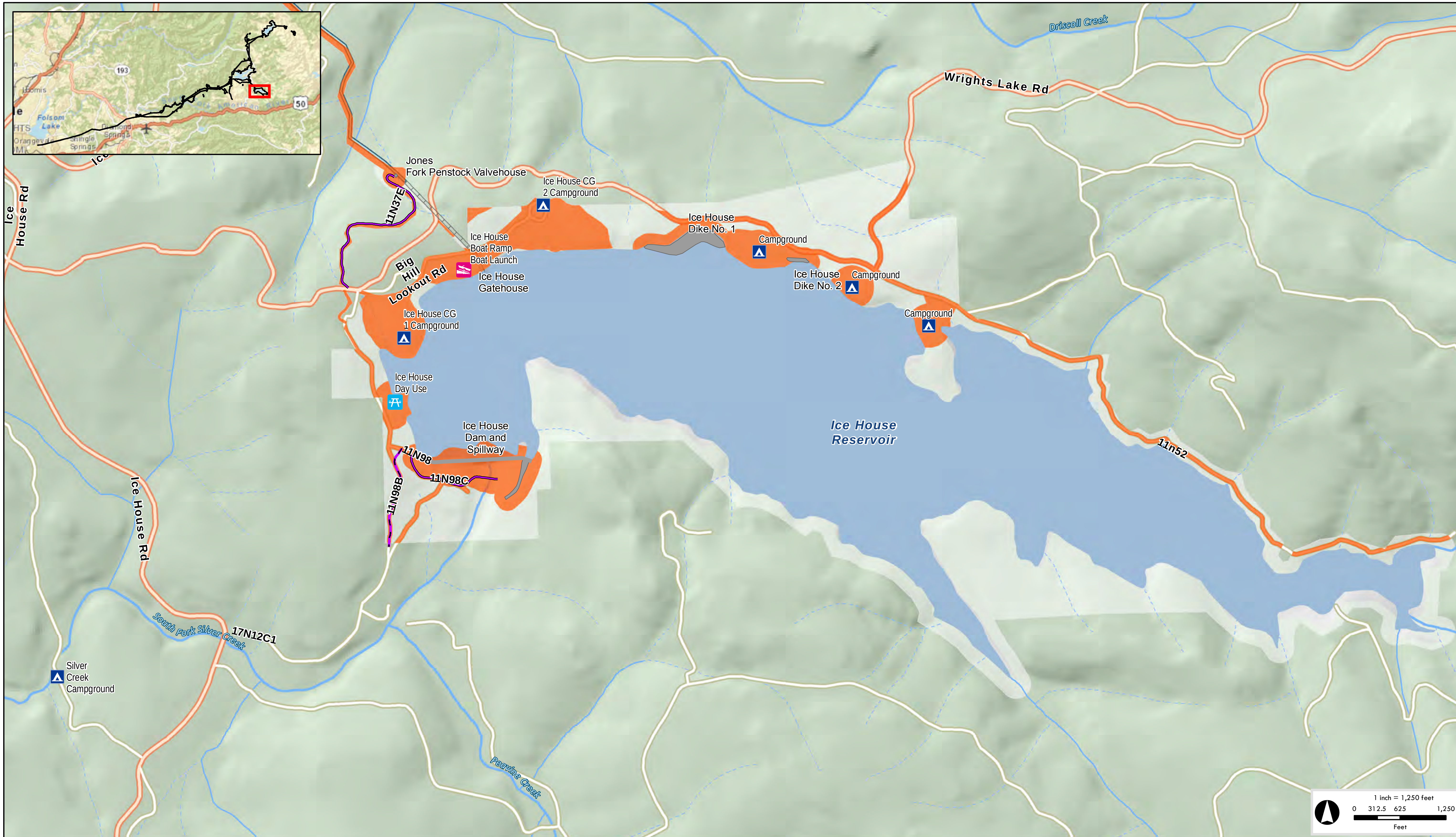
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 12 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

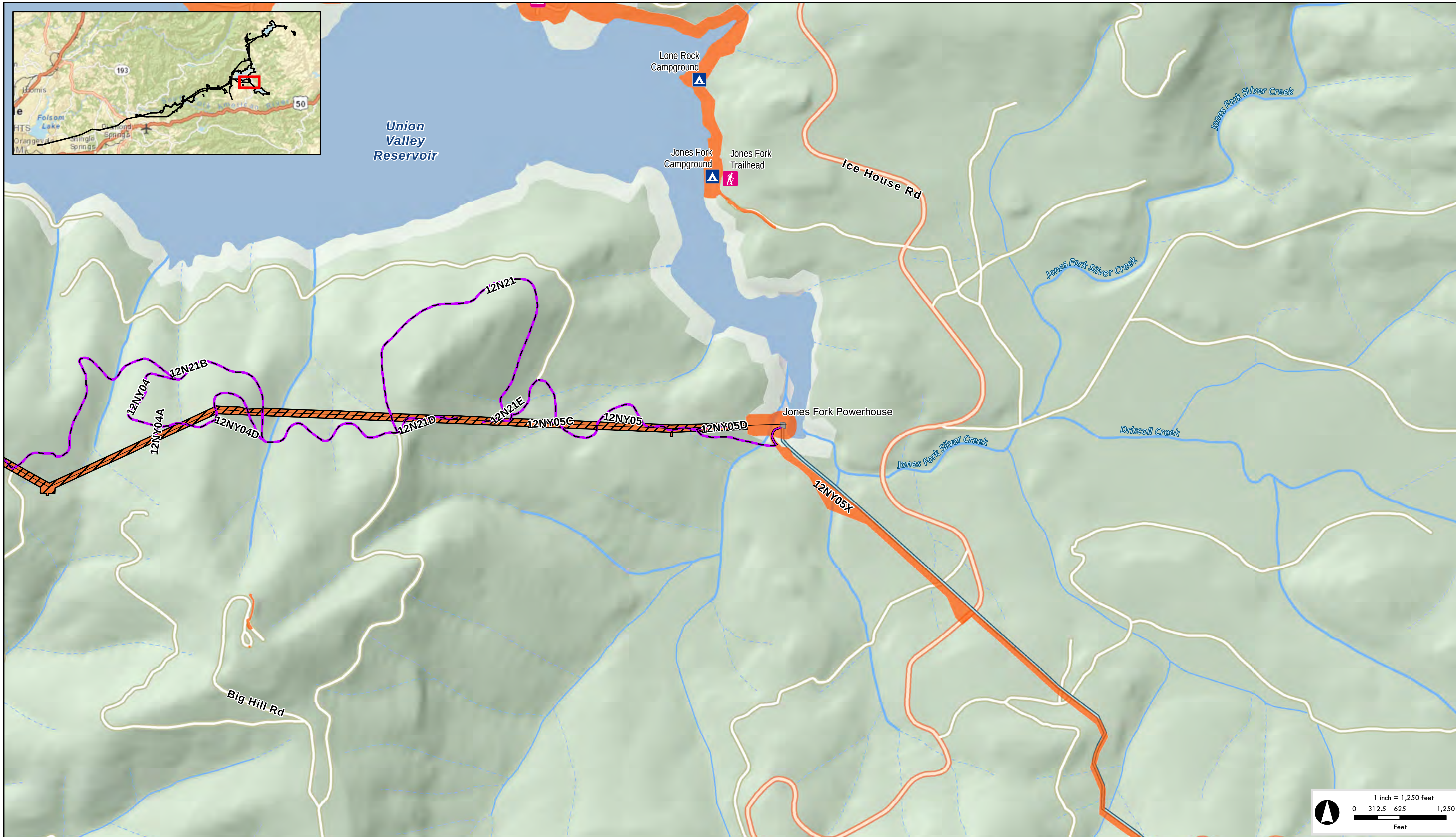
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 13 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

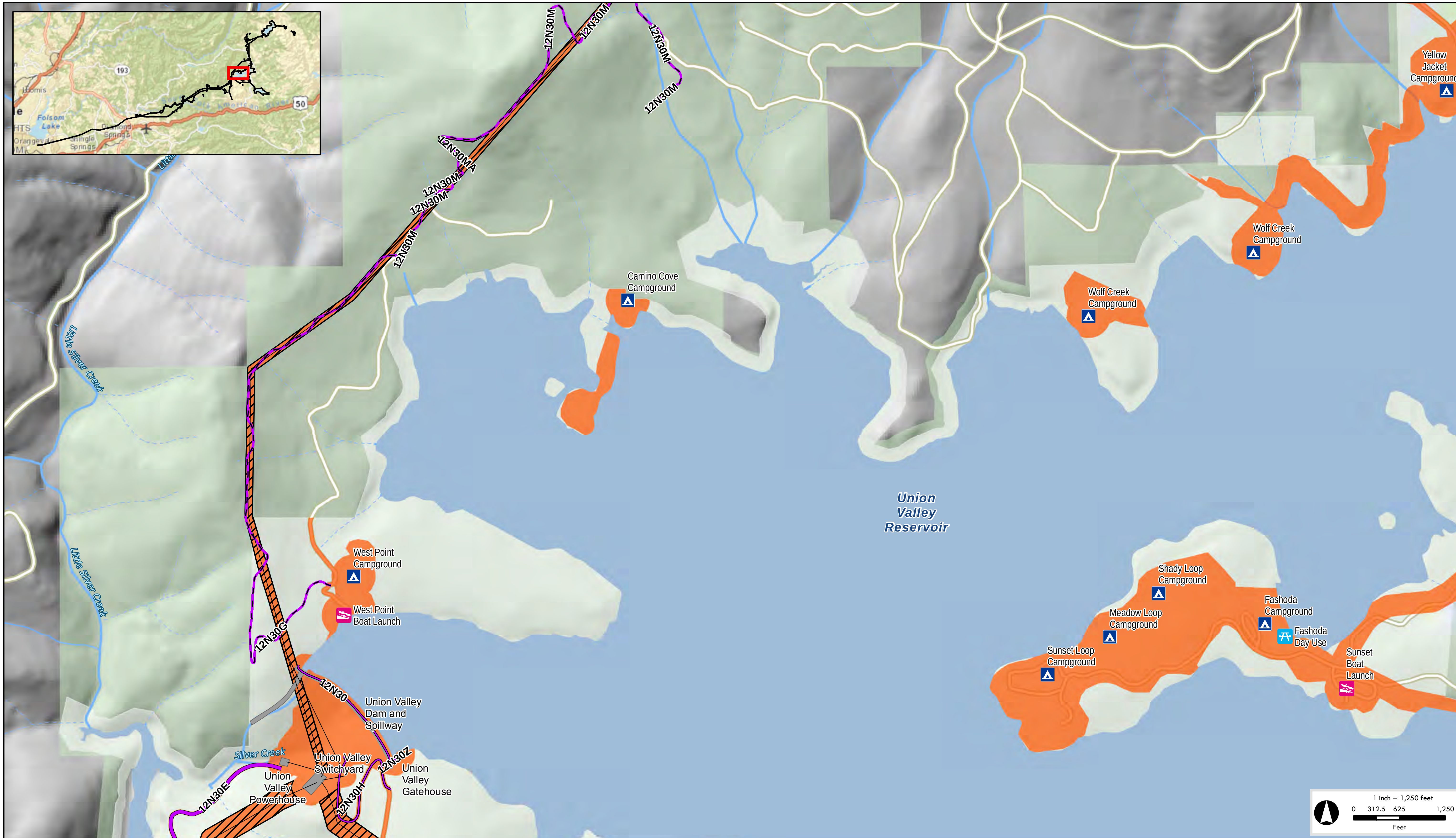
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 14 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

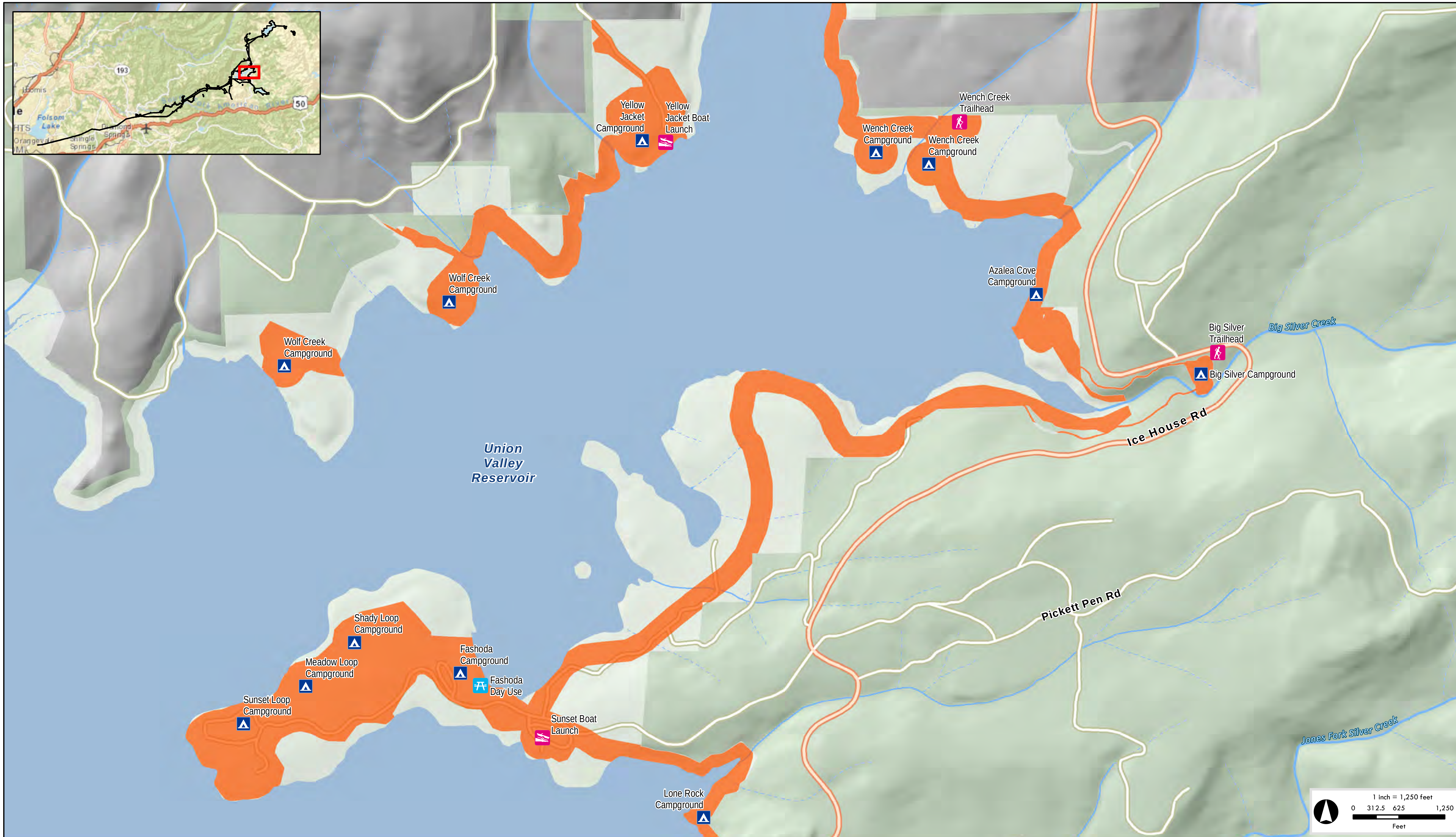
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 15 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

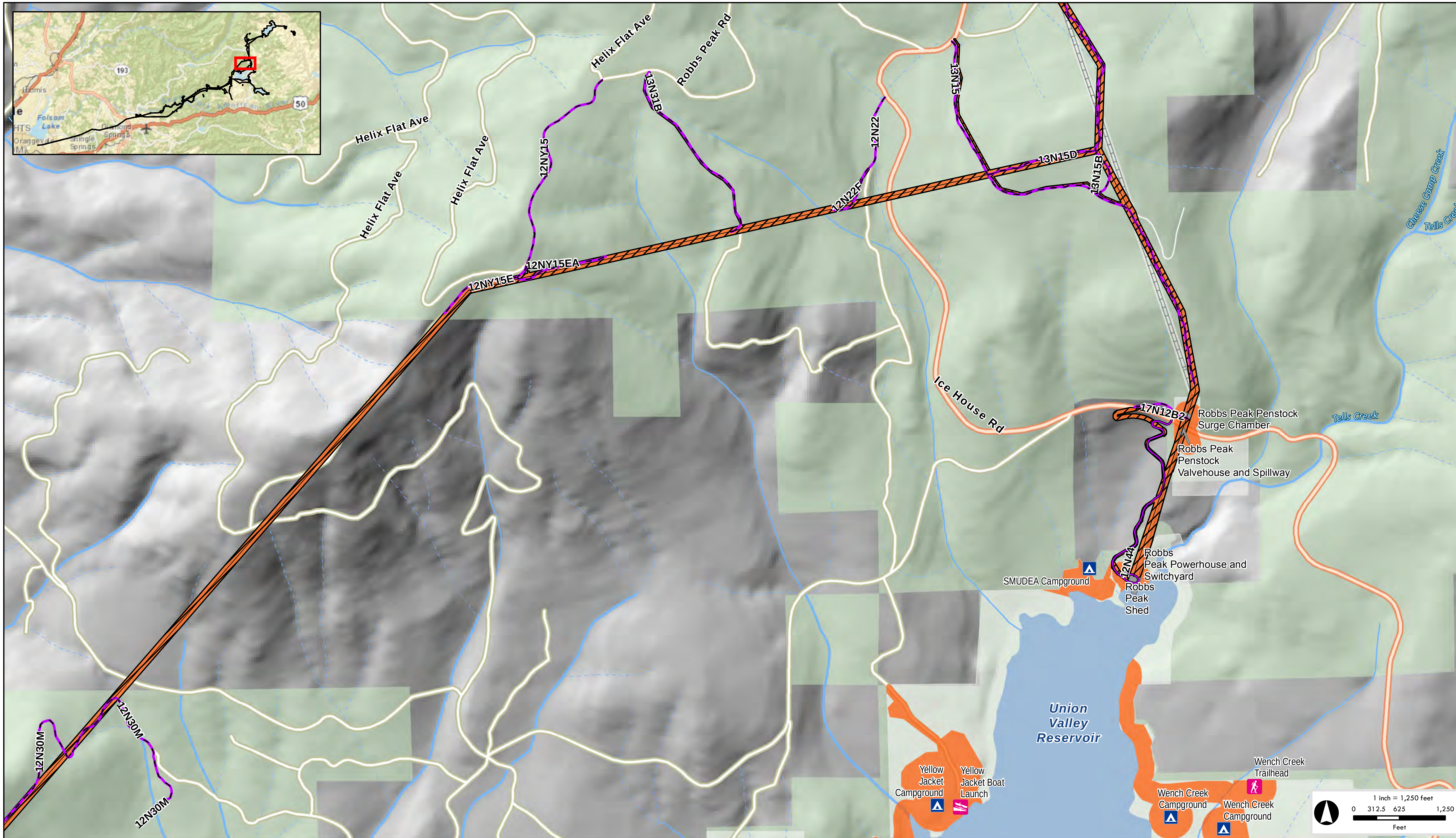
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 16 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

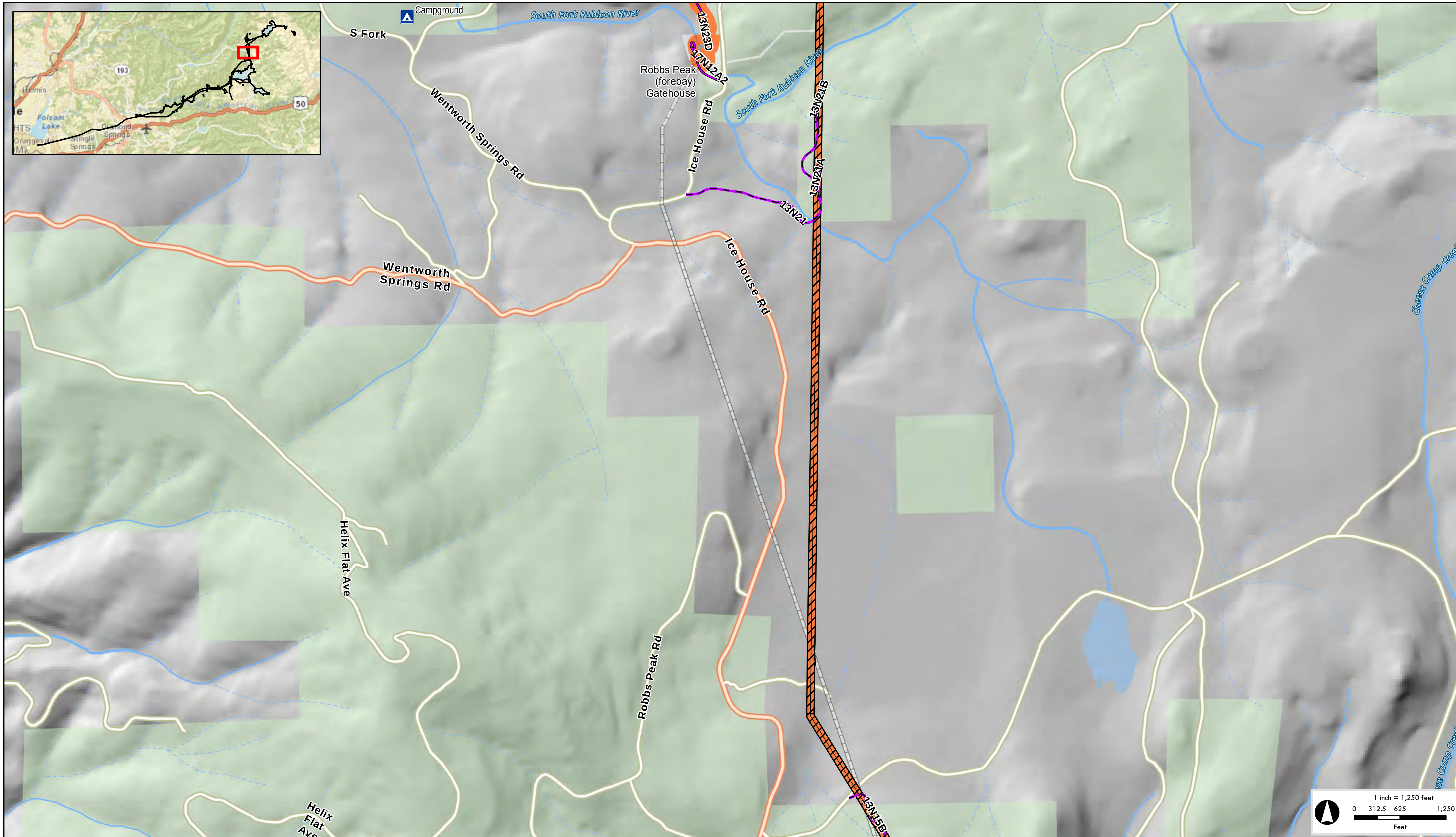
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 17 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

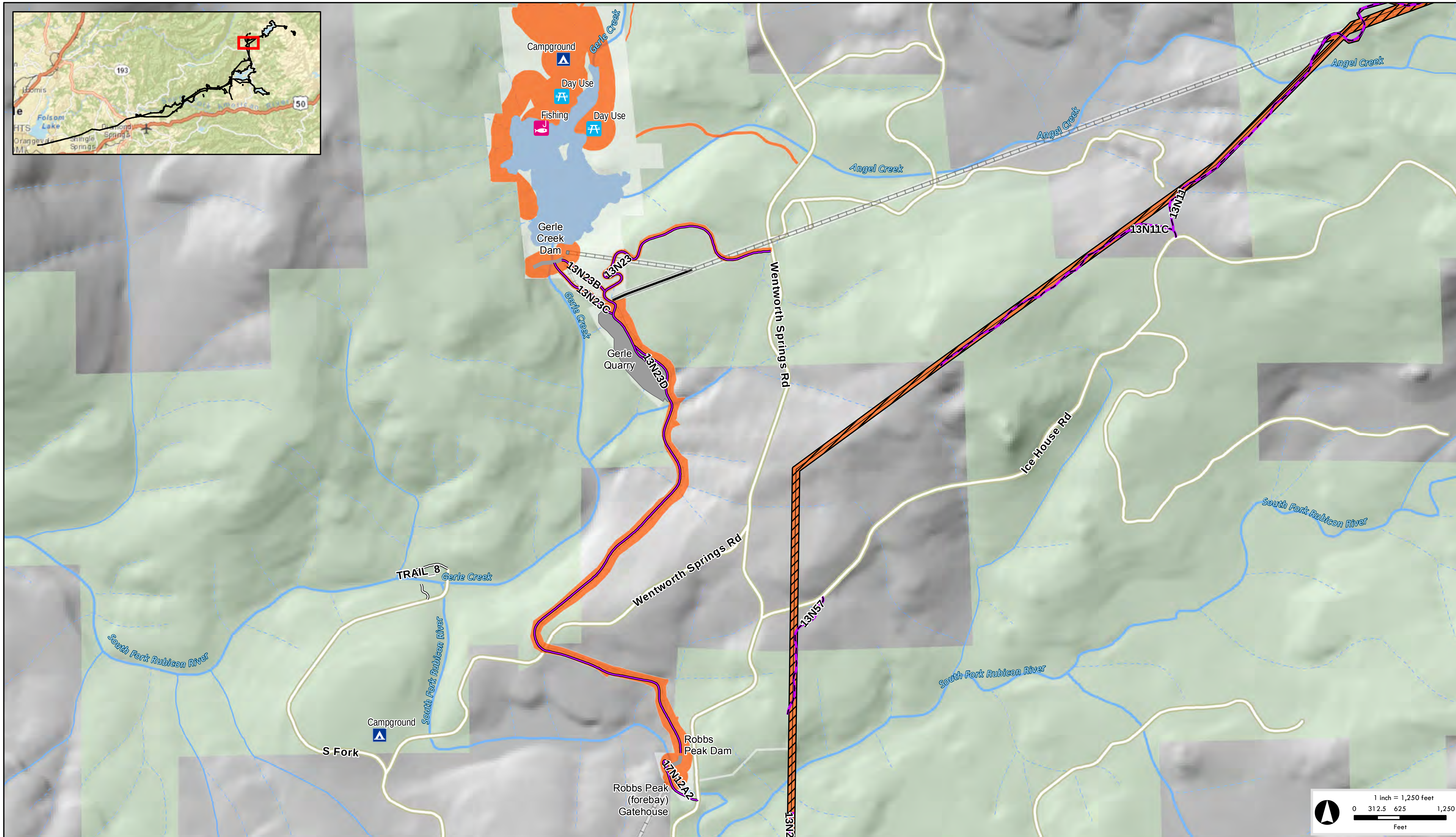
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 18 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

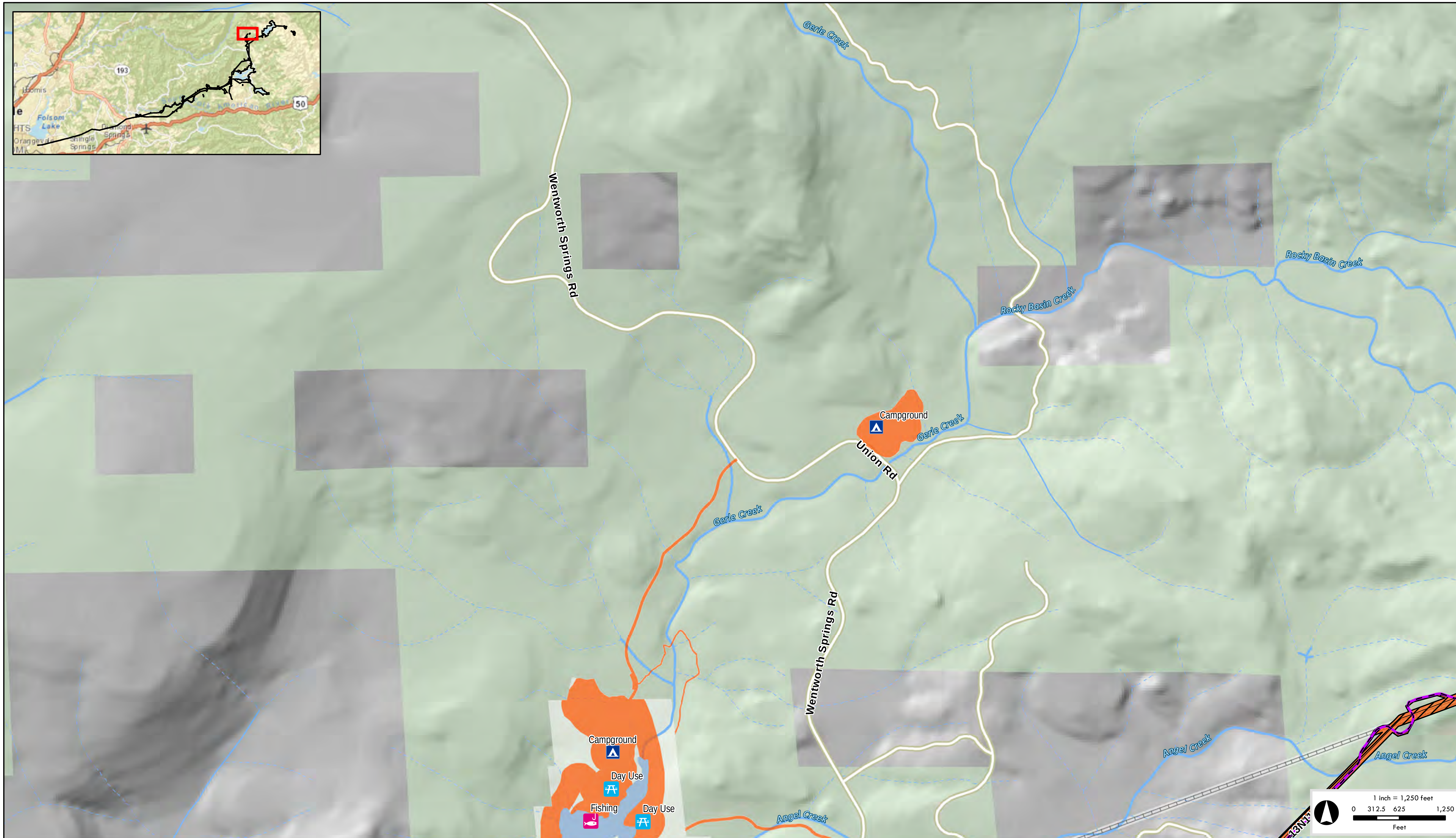
UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan



ATKINS

FIGURE 2
Survey Area - Page 19 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

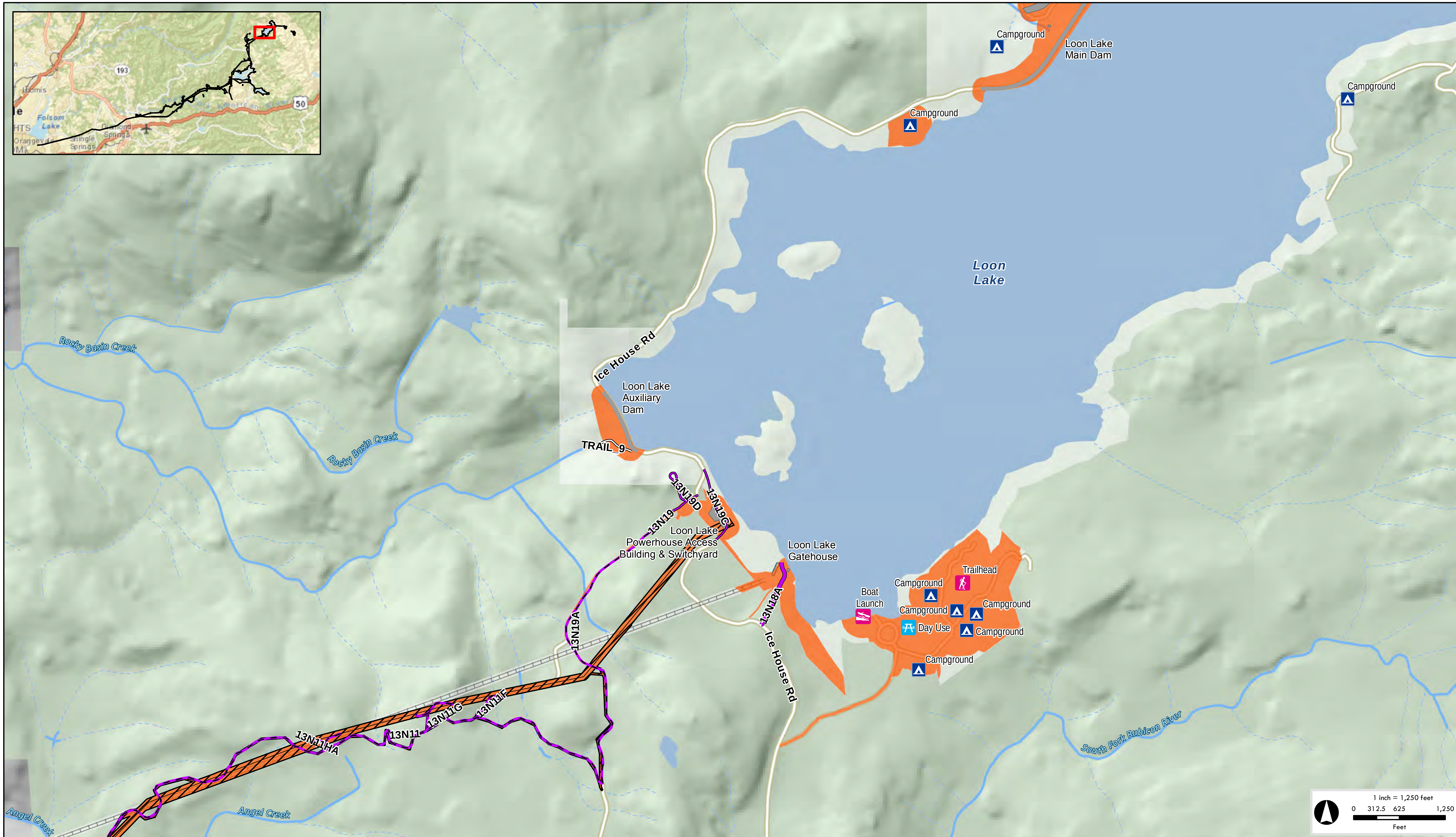
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 20 of 22

- FERC Boundary
- UARP Dams
- UARP Facilities
- FERC Boundary Survey Area
- Excluded from 2016 Surveys*
- *Recent survey data exists for these areas
- BLM Land
- US Forest Service Land
- Transmission Line
- Adit
- Canal
- Channel
- Penstock
- Tunnel
- SMUD administrative trails
- Perennial Stream
- Intermittent Stream
- Ephemeral Stream
- Boat Launch
- Campground
- Day Use
- Fishing

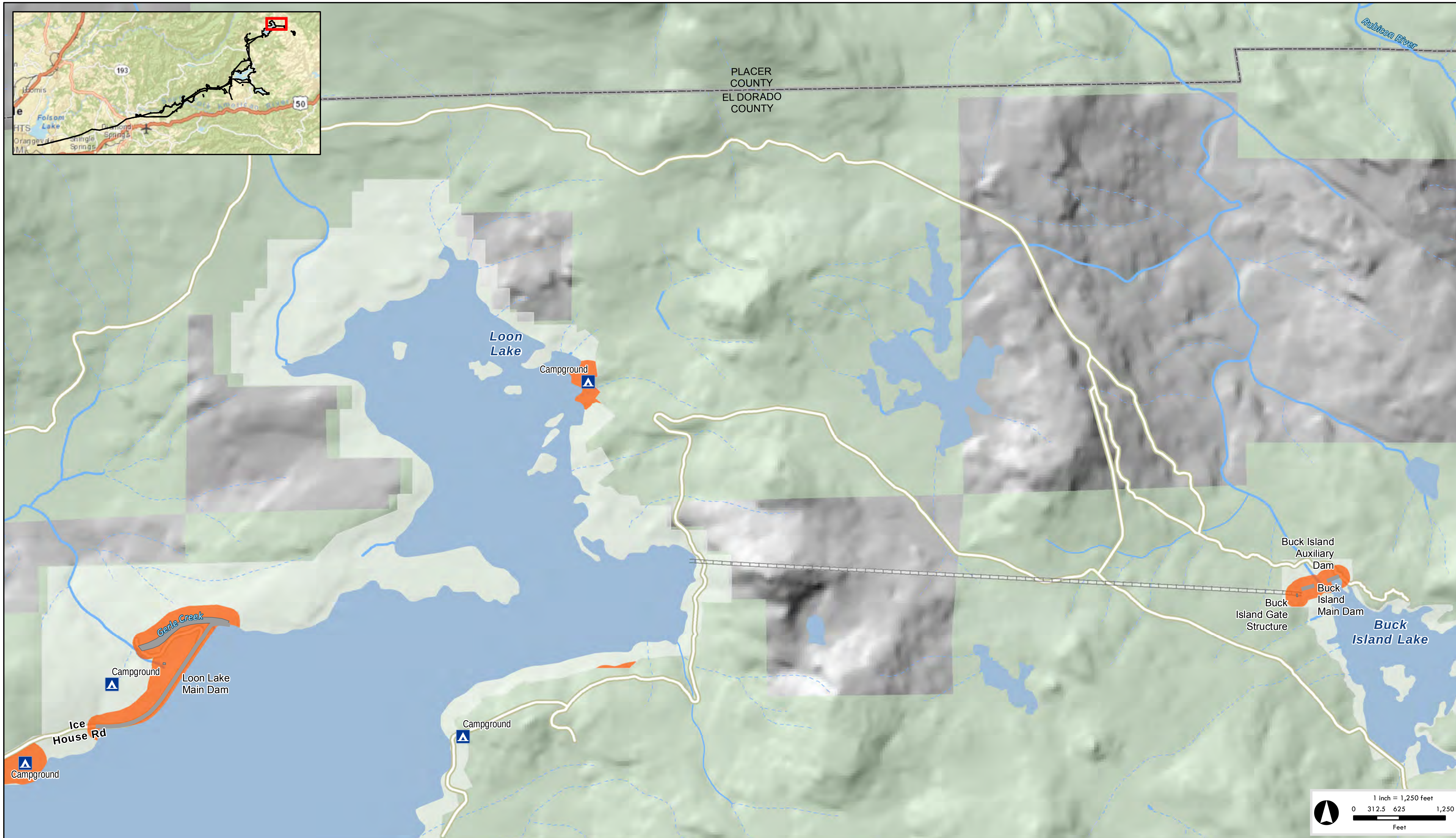
UARP Project Related Roads**
- SMUD (2)
- SMUD (3)
- SMUD (4)
- Trailhead
- USFS (1)
- USFS (2)
- USFS (3)
- USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 21 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing
Trailhead

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)

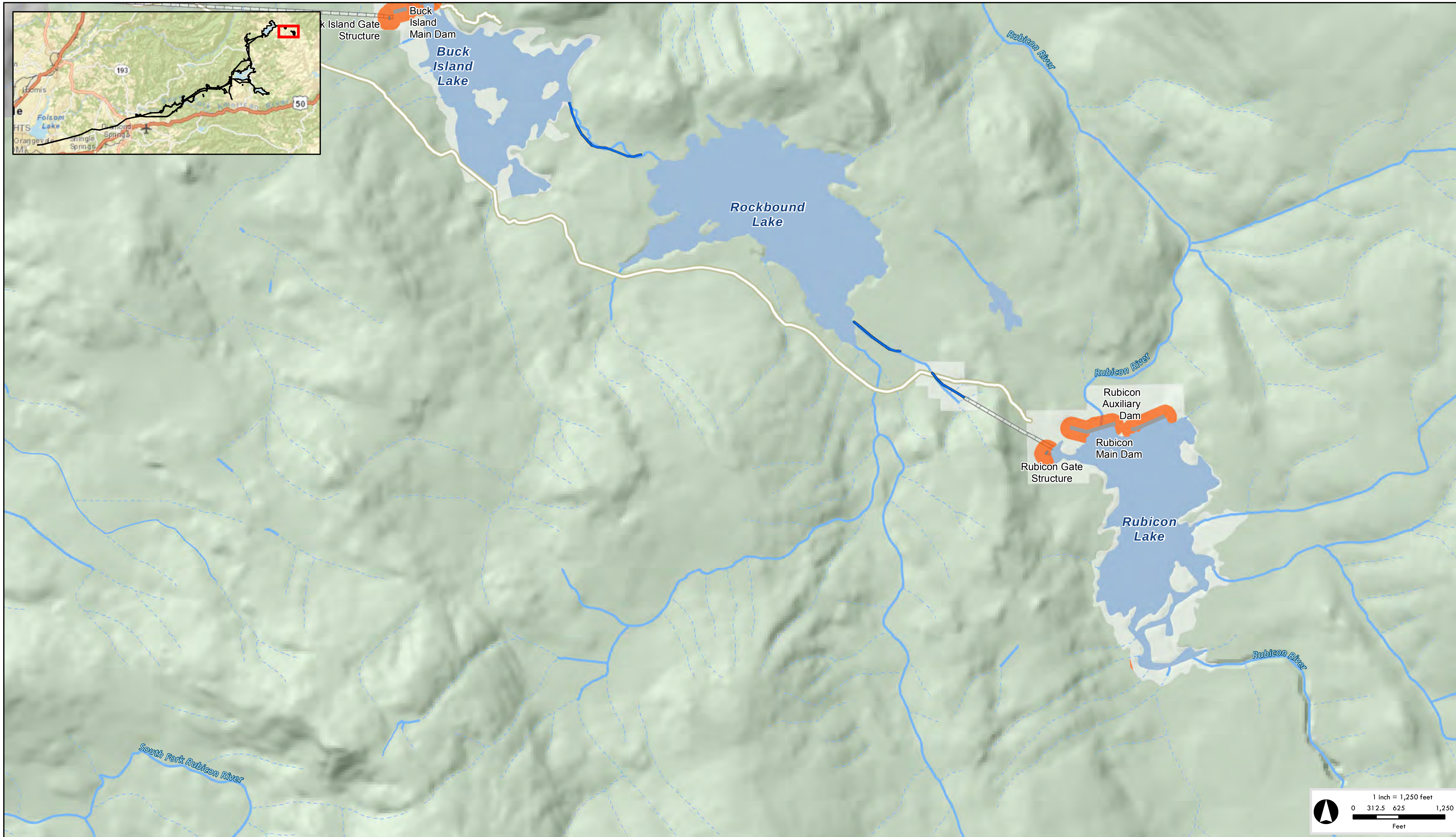
USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

1/7/2016 gool4566 P:\All Employees - Projects (RSVL FILES)\10004+\46406 SMUD UARP Veg Inv Weed Mgt Plan\08 GIS\mxd\Fig2_UARP_SurveyAreaMapbook.mxd



ATKINS

FIGURE 2
Survey Area - Page 22 of 22

FERC Boundary
UARP Dams
UARP Facilities
FERC Boundary Survey Area
Excluded from 2016 Surveys*
*Recent survey data exists for these areas

BLM Land
US Forest Service Land
Transmission Line
Adit
Canal
Channel

Penstock
Tunnel
SMUD administrative trails
Perennial Stream
Intermittent Stream
Ephemeral Stream

Boat Launch
Campground
Day Use
Fishing

UARP Project Related Roads**
SMUD (2)
SMUD (3)
SMUD (4)
Trailhead

USFS (1)
USFS (2)
USFS (3)
USFS (4)

**USFS Maintenance Level Classifications
(1) Basic custodial care (closed)
(2) High clearance vehicles
(3) Suitable for passenger cars
(4) Moderate degree of user comfort

Source: SMUD, 2015; ESRI, 2016

SMUD - UARP Invasive Weed Management Plan

6.0 REFERENCES

Bakke, David. 2001. A review and Assessment of the Results or Water Monitoring for Herbicide Residues for the Years 1991 to 1999 USFS Region Five. February.2001

Bakke, David. 2002 and updated 2007. Analysis of Issues Surrounding the Use of Spray Adjuvants With Herbicides. USDA Forest Service.

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Bramble, W.C., and W.R. Byrnes. 1996. Integrated vegetation management of an electric utility right-of-way ecosystem. Down to Earth 51(1): 29-34.

CalFlora: Information on California plants for education, research and conservation, with data contributed by public and private institutions and individuals, including the Consortium of California Herbaria. [web application]. 2015. Berkeley, California: The CalFlora Database [a non-profit organization]. Available: http://www.calflora.org/ (Accessed: Nov 11, 2015).

California Department of Fish and Wildlife. 2015. Biogeographic Information and Observation System/California Natural Diversity Database (BIOS/CNDDB). Accessed: November.

California Department of Food and Agriculture. 2015. Pest Health and Prevention Services.

California Noxious Weeds. Available at https://www.cdfa.ca.gov/plant/ipc/encycloweedia/weedinfo/winfo_table-sciname.html Accessed: September.

California Department of Pesticide Regulation; Pesticide Safety Information Series, September 2003 and 2004, www.dpr.ca.gov. PSIS N-2. Storing, Moving and Disposing of Pesticides in Non-Agricultural Settings, PDF (Rev. 09/15, 345 kb) (En Español, 242 kb) (In Punjabi, 620 kb)

California Invasive Plant Council (Cal-IPC). 2012. Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.). Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA. Available at http://www.cal-ipc.org.

____. 2015a. Best Management Practices for Wildland Stewardship: Protecting Wildlife When Using Herbicides for Invasive Plant Management. Cal-IPC Publication 2015-1. California Invasive Plant Council, Berkeley, CA. Available at http://www.cal-ipc.org

____. 2015b. Invasive Plant Inventory. Available at http://www.cal-ipc.org/ip/inventory/ Accessed: November.

____. 2015c. Regional Programs for Weed-Free Aggregate. Available at http://www.cal-ipc.org/ip/prevention/weedfreegravel.php Accesses: November.

California Native Plant Society (CNPS), Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Available at http://www.rareplants.cnps.org Accessed: November.

California Regional Water Quality Control Board. Basin Plan. Available at http://www. www.waterboards.ca.gov.

Center for Sierra Nevada Conservation. 2014. Project Description for Grants and Cooperative Agreement Program Restoration Application. March 3.

El Dorado County Invasive Weed Management Group (EDCIWMG). 2010. Memorandum of Understanding.

_________. 2015. A Builder and Contractor's Guide to Preventing the Introduction and Spread of Invasive Weeds. Available at http://ucanr.org/edc Accessed: October.

Federal Energy Regulatory Commission. 2014. Order Issuing New License for Sacramento Municipal Utility District Upper America River Hydroelectric Project No.2101. Project No. 2101-084. July 23.

Natural Resources Conservation Service. National Plant Database National Symbol Protocol. Available at http://www.nrcs.org.

North American Weed Management Association. Weed-Free Aggregate Program. Sierra Nevada Region. Available at http://www.cal-ipc.org/ip/prevention/weedfreegravel.php

Sacramento Municipal Utility District (SMUD). 2007. Relicensing Settlement Agreement for the Upper American River Project and Chili Bar Hydroelectric Project. Sacramento Municipal Utility District, Sacramento, CA.

____. 2008. Final Historic Properties Management Plan, Version 2. October.

____. 2012. Transmission Line Integrated Vegetation Management Plan for the Upper American River Project (UARP). FERC Project No. P-2101. November.

____. 2015a. Facilities Management Plan. FERC Project No. 2101. June.

____. 2015b. Transportation and Trails System Management Plan for the UARP. U.S. Bureau of Land Management (BLM). 2008. Integrated Vegetation Management. Handbook H1740-2. March 25.

____. 2015. Pine Hill Preserve. Available at http://www.pinehillpreserve.org/ Accessed: October.

U.S. Department of Agriculture (USDA). 2001and 2004. Forest Service, Pacific Southwest Region. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement and Record of Decision, USDA Forest Service, Pacific Southwest Region, Vallejo, CA. 138p.

____.2011. R5 FSH 2509.22 - Soil and Water Conservation Handbook. Available at: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5399662.pdf

____. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. April.

_____ 2012. Water Quality Management for Forest System Lands in California, Best Management Practices. http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5395282

____. 2013. Forest Service Eradication and Control of Invasive Plants. Environmental Assessment. May.

____. 2014. Eldorado National Forest, Standard Road Maintenance Specifications for Roads. March.

____. 2015a. Forest Service Classification and Assessment with Landsat of Visible Ecological Groupings (CALVEG). Available at http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/. Accessed: November.

____. 2015b. Forest Service Invasive Plant list for the Eldorado National Forest. March 10.

U.S. Fish and Wildlife Service (USFWS). 1999. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project No. 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

______. 2002. Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills. August.

_____. 2007. National bald eagle management guidelines.

____. 2009. Biological Opinion for the Upper American River Project (FERC 2101). September 28.

____. 2015. Information for Planning and Conservation (IPaC) Trust Resource Report for SMUD UARP VIWMP. Generated: November.

Appendix A
Human Health Risk Assessment for the Upper American River Project Vegetation and Invasive Weed Management Plan

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

The purpose of this analysis is to assess the risks to human health of using herbicides prescribed in the Sacramento Municipal Utility District (SMUD), Upper American River Project (UARP), Vegetation and Invasive Weed Management Plan (VIWMP). The herbicides being evaluated include: aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr, sulfometuron methyl, and triclopyr (triethylamine salt (TEA) and butoxy-ethyl-ester (BEE). The prescribed surfactant will be a modified seed oil surfactant/diluent (Competitor). These herbicides have been approved by the United States Environmental Protection Agency (EPA) and are appropriate for use within the UARP due to their environmental compatibility combined with their efficacy in treating unwanted vegetation.

As described in the VIWMP, the use of herbicides is an important component of the Integrated Vegetation Management (IVM) program designed for maintenance of UARP hydroelectric facilities. Unwanted and overgrown vegetation can interfere with operation and maintenance of facilities involved in the generation, transmission, and distribution of electricity. Effective vegetation management within the Project area is essential for the safe, reliable and economical operation of the hydroelectric project. The use of herbicides is needed to improve safety and reliability of the facilities and to reduce the possibility of catastrophic wildfires.

This risk assessment examines the potential health effects on all groups of people who might be exposed to any of the eight herbicides and surfactants that could be used in treating the vegetation within UARP project boundary and along designated access roads. Those humans potentially at risk fall into two groups: workers and members of the public. Workers include applicators, supervisors, and other personnel directly involved in the application of herbicides. The public includes other forest workers, forest visitors, and nearby residents who could be exposed through the drift of herbicide spray droplets, through contact with sprayed vegetation, or by eating, or placing in the mouth, food items or other plant materials, such as berries or shoots growing in or near forests, by eating game or fish containing herbicide residues, or by drinking water that contains such residues.

A diverse portfolio of herbicides is needed to allow for greater adaptability, environmental compatibility, and efficacy. These products have toxicological profiles that are considered environmentally compatible for use within the UARP. The hazards associated with using these herbicides have been evaluated via comprehensive reviews of available toxicological studies. These reviews are presented as a series of product specific risk assessments completed by Syracuse Environmental Research Associates (SERA) under contract with the United States Forest Service and are incorporated by reference into this risk assessment. Copies of these risk assessments are included in the project record.

Below are project risk assessments for each herbicide prescribed. Product specific work sheets developed by the Forest Service—in cooperation with the SERA; Spreadsheets

(WorksheetMaker, version 6.01.16) were prepared for each herbicide (see Table 1). Tables 19 through 25 below provide Hazard Quotients for various scenarios and exposures. The USDA Forest Service risk assessments and the WorksheetMaker can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml. Product labels and material safety data sheets (MSDS's) can be provided upon request.

Table 1. Comparison of the Proposed Chemicals and Application Rates

Chemical	Proposed Action; Risk assessment Proposed Maximum Application Rate
Aminopyralid	.011 a.e. lbs./acre
Chlorsulfuron	.05 ai lb./acre
Clopyralid	0.14 a.e. lbs./acre
Glyphosate	2 a.e. lbs./acre
Imazapyr	.33 a.e. lbs./acre
Sulfometuron Methyl	.14 ai lbs./acre
Triclopyr (TEA)	2 a.e. lbs./acres
Triclopyr (BEE)	2 a.e. lbs./acre

Application rate units: acid equivalent pounds per acre (a.e. lbs./acre)

Each compound has unique characteristics with specific intent for use within the VIWMP Program. Project-specific protection measures and Best Management Practices (BMPs) were prepared for this project (see Section 5 of the VIWMP, Tables 6 and 7). The BMPs and protection measures are designed to minimize risks to human health and the environment.

Specific recommendations for treatments in each area within the UARP will be determined by licensed Pest Control Advisors. The site-specific recommendations will prescribe the appropriate combination of herbicides and will consider various factors such as population density, presence of native and sensitive plants, and proximity to other sensitive resources.

1.1 SUMMARY OF RISK AND EXPOSURE

The application of aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr, sulfometuron methyl and triclopyr (TEA and BEE formulations) proposed as part of the VIWMP is expected to present a low risk to human health and safety. Based on the available information, the addition of the proposed surfactant and dye, would also pose a low risk to human health and safety. The protection measures and BMPs are designed to reduce the level of exposure and associated risk to the health and safety of workers and members of the public. This is based on the analysis included in the SERA risk assessments (SERA WorkbookMaker, version 6.01.16 2017), as well as the project-level risk characterization described in this appendix, which was conducted using the specific chemicals, application rates, and volumes proposed for controlling unwanted vegetation within the UARP area and access roads.

2.0 RISK ASSESSMENTS

The USDA Forest Service has developed a process for analyzing the risk associated with the use of a specific herbicide. Each of the herbicides described below has undergone a detailed toxicological analysis with application criteria. In addition to the general assessment, each herbicide has a separate spreadsheet which allows for project-specific analyses. The purpose of the analysis is to assess the risk to human health and the environment from the use of various herbicides. These assessments provide a method for analyzing the potential health effects of workers and members of the public who might be exposed to the herbicides. Exposure scenarios are also explained in the risk assessment reports for each of the herbicides.

The SERA spreadsheets have been developed over several years and are continually revised and improved to provide the best possible analysis. The assessment capabilities are not the same for each compound. In each scenario, the best and most plausible scenarios are evaluated. The project-specific spreadsheets consider risk human risk associated with this project.. The assessments compare a potential exposure dose with the established daily reference dose (RfD) established by the U.S. EPA. This is expressed in the form of a hazard quotient (HQ). The RfD is defined as the level of exposure at or below which no acute or chronic health effects are expected to occur. The hazard quotient is the project potential exposure dose and is expressed as ratio of exposure to the RfD. Project-specific evaluations of each herbicide were completed. Each herbicide-specific spreadsheet analyses four human risk potentials. The following is the result and discussion of the evaluation of the project-specific herbicides.

2.1 EXPOSURE ANALYSIS

This exposure assessment examines the potential health effects to two groups of people that are most likely to be exposed to aminopyralid, chlorsulfuron clopyralid, glyphosate, imazapyr, sulfometuron methyl and triclopyr (TEA and BEE formulations): workers and members of the public. Workers include applicators, supervisors, and other personnel directly involved in the application of herbicides. The public includes other USDA Forest Service personnel, visitors, or nearby residents who could be exposed through herbicide drift, contact with sprayed vegetation, by drinking water that contains herbicide residue, or by eating contaminated vegetation (such as berries or foliage), game, or fish.

In these analyses, data are displayed for three different exposure scenarios: typical, lower, and upper. The upper level represents a conservative estimate of a worst-case scenario resulting from the highest application rate, lowest dilution rate, and largest number of acres treated per day. This approach is used to encompass as broadly as possible the range of potential exposures. The most important factor in exposure and the evaluation is the impact of application volume and the subsequent concentration mixed in the field. All risk assessments consider the range of application volumes, field concentration, and subsequent potential exposures

The UARP includes electric transmission rights-of-way (ROWs), hydro-electric facilities, and access roads that are within the Eldorado National Forest. All treatment areas are designed to be no closer than 1/2 mile from any permanent human habitation. Any exposure due to spray drift from this type of herbicide application to residents living beyond the minimum ¼ mile limit from the treatment site would be negligible. Facilities (potential treatment sites) have limited access and minimal public use, which will further reduce exposure potential as well. Much of the area is used for recreation, which could include activities such as hiking, berry picking, or plant gathering. During these activities, the public could pass close to or through these sites. Treatments will be made at a time when much of the activities would not occur. Potential risk from exposure is minimal and not expected to pose a significant risk to workers or to the public. According to recent work completed by the California Department of Pesticide Regulation (DPR), exposure to native plant material collectors can be essentially eliminated if they remain at least 100 feet from the treated areas. In the DPR study (published 2001), herbicides were detected in 19 of 227 (8%) samples taken outside both aerial and ground-based herbicide application units, and the majority of the positive samples (90%) were within 70 feet of the edge of the sampled unit. All positive samples had concentrations of herbicides less than or equal to 2.68 parts per million (Goh 1999). These studies did not determine whether these detected amounts were due to drift or to application error. These studies suggest that with ground-based applications, negligible amounts of off- site movement due to drift would be expected beyond 75 to 100 feet from the treatment area. Selective spot applications with backpacks should further reduce the potential for off-target movement.

Following the above procedures, using the same non-site-specific data as used in the SERA Risk Assessments (SERA 2017a-j), and based on site-specific herbicide-use levels, doses were calculated for potentially exposed workers and members of the public and are displayed in Product-specific Risk Assessment Worksheets (available upon request). Dose estimates are based on actual field studies of worker exposures and public dose estimates have been extrapolated from the worker exposure data. Exposure scenarios for workers include exposure during normal operations, as well as four accident scenarios.

Considering the operational constraints, protection measures and BMPs that were developed for the VIWMP, members of the general public should not be exposed to significant levels of herbicide. Nonetheless, several exposure scenarios for each herbicide have been developed for the general public. These scenarios consider incidents that might occur although the probability is remote. In these scenarios, conservative assumptions are used to show the effects of high levels of exposure. Exposure scenarios developed for the general public includes both acute exposure and longer-term or chronic exposure. A majority of the acute exposure scenarios are accidental and they assume that an individual is exposed to the compound either during or shortly after its application. Using MS Excel spreadsheets developed by SERA, the exposure risks were calculated using proposed project application rates and herbicide solution concentrations.

2.2 SUMMARY OF WORKER EXPOSURES

The following tables provide a summary of the general and accidental exposure scenarios calculated for workers.

Table 2. Summary of Worker Exposure Scenarios for Aminopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.00144375	0.0000495	.0088
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	1.2408E-07	2.385E-08	6.864E-07
Contaminated Gloves, 1 hour	7.4448E-06	0.000001431	0.000041184
Spill on hands, 1 hour	2.91389E-05	4.37549E-06	0.000210936
Spill on lower legs, 1 hour	7.18066E-05	1.07825E-05	0.000519807

*Analyzed at the Maximum Application Rate of 0.11 a.e. lbs./Acre.

Table 3. Summary of Worker Exposure Scenarios for Chlorsulfuron

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0000672	0.00000144	0.0005184
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	1.334E-07	3.634E-08	5.244E-07
Contaminated Gloves, 1 hour	0.000008004	2.1804E-06	0.000031464
Spill on hands, 1 hour	5.01075E-06	7.72786E-07	3.28172E-05
Spill on lower legs, 1 hour	1.23479E-05	1.90437E-06	8.0871E-05

*Applied at the Maximum Application Rate of 0.05 a.i. lbs./Acre.

Table 4. Summary of Worker Exposure Scenarios for Clopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0018375	0.000063	0.0112
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	2.856E-07	5.896E-08	0.00000143
Contaminated Gloves, 1 hour	0.000017136	3.5376E-06	0.0000858
Spill on hands, 1 hour	5.07872E-05	8.36106E-06	0.000326853
Spill on lower legs, 1 hour	0.000125154	2.0604E-05	0.000805459

*Applied at the Maximum Application Rate of 0.14 a.e. lbs./Acre.

Table 5. Summary of Worker Exposure Scenarios for Glyphosate

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.02625	0.0009	0.16
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0000036	7.104E-07	0.00002016
Contaminated Gloves, 1 hour	0.000216	0.000042624	0.0012096
Spill on hands, 1 hour	0.000472223	0.0001198	0.001535232
Spill on lower legs, 1 hour	0.001163693	0.000295222	0.003783251

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 6. Summary of Worker Exposure Scenarios for Imazapyr: chopper

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.00433125	0.0001485	0.0264
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.00005488	0.0000224	0.0001738
Contaminated Gloves, 1 hour	0.0032928	0.001344	0.010428
Spill on hands, 1 hour	0.000517156	0.000168923	0.002196174
Spill on lower legs, 1 hour	0.001274419	0.000416274	0.005412

*Applied at the Maximum Application Rate of .33 a.e. lbs./Acre.

Table 7. Summary of Worker Exposure Scenarios for Sulfometuron Methyl

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.0018375	0.000063	0.0112
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	8.568E-07	0.000000268	0.00000286
Contaminated Gloves, 1 hour	0.000051408	0.00001608	0.0001716
Spill on hands, 1 hour	1.77388E-05	3.08729E-06	0.000103437
Spill on lower legs, 1 hour	4.37136E-05	7.60795E-06	0.000254899

*Applied at the Maximum Application Rate of 0.14 a.i. lbs./Acre.

Table 8. Summary of Worker Exposure Scenarios for Triclopyr (TEA)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day
General Exposure (dose in mg/kg/day)			
Backpack application	0.02625	0.0009	0.16
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0000576	0.0000192	0.0001728
Contaminated Gloves, 1 hour	0.003456	0.001152	0.010368
Spill on hands, 1 hour	0.001013314	0.000276439	0.003988413
Spill on lower legs, 1 hour	0.002497095	0.000681224	0.009828589

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 9. Summary of Worker Exposure Scenarios for Triclopyr (BEE)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
General Exposure (dose in mg/kg/day)			
Backpack application	0.05075	0.00258	0.624
Accidental/Incidental Exposures (dose in mg/kg/day)			
Immersion of hands, 1 minute	0.0312	0.012672	0.0832
Contaminated Gloves, 1 hour	1.872	0.76032	4.992
Spill on hands, 1 hour	0.00356567	0.001105257	0.012391347
Spill on lower legs, 1 hour	0.008786831	0.002723668	0.03053582

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

2.3 SUMMARY OF GENERAL PUBLIC EXPOSURES

The following tables provide a summary of the exposure scenarios calculated for members of the general public.

Table 10.Summary ofPublic Exposure Scenarios for Aminopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.10E-03	1.65E-04	7.97E-03
Direct Spray, feet and lower legs, woman	1.11E-04	1.66E-05	8.01E-04
Water Consumption, spill, child	5.63E-03	2.76E-04	1.88E-02
Fish Consumption, spill, adult male	1.69E-04	1.36E-05	3.76E-04
Fish Consumption, spill, subsistence populations	8.24E-04	6.62E-05	1.83E-03
Dermal Exposure, contaminated vegetation	1.04E-04	1.96E-05	5.53E-04

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Contaminated Fruit	1.29E-03	5.91E-04	2.05E-02
Contaminated Vegetation	1.78E-02	1.24E-03	1.49E-01
Swimming, one hour, adult female	2.73E-09	1.31E-11	6.80E-08
Water Consumption, non-spill, child	8.27E-04	1.01E-05	7.44E-03
Consumption of Fish, non-spill, adult male	2.48E-05	4.97E-07	1.49E-04
Consumption of Fish, non-spill, subsistence populations	1.21E-04	2.42E-06	7.26E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.75E-04	9.93E-05	5.25E-03
Contaminated Vegetation	3.79E-03	2.08E-04	3.80E-02
Consumption of Water, adult male	1.26E-04	2.20E-06	9.81E-04
Consumption of Fish, adult male	6.29E-07	1.57E-08	4.09E-06
Consumption of Fish, subsistence population	5.09E-06	1.27E-07	3.31E-05

* Maximum Application Rate of 0.11 a.e. lbs./Acre

Table 11. Summary of General Public Exposure Scenarios for Chlorsulfuron

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.89E-04	2.92E-05	1.24E-03
Direct Spray, feet and lower legs, woman	1.90E-05	2.93E-06	1.25E-04
Water Consumption, spill, child	2.48E-03	1.20E-04	8.11E-03
Fish Consumption, spill, adult male	7.43E-05	5.89E-06	1.62E-04
Fish Consumption, spill, subsistence populations	3.62E-04	2.87E-05	7.91E-04
Dermal Exposure, contaminated vegetation	1.66E-05	3.23E-06	8.21E-05
Contaminated Fruit	5.64E-04	2.58E-04	8.96E-03
Contaminated Vegetation	7.78E-03	5.40E-04	6.48E-02
Swimming, one hour, adult female	2.92E-09	1.00E-10	1.75E-08
Water Consumption, non-spill, child	3.61E-04	2.20E-05	1.08E-03
Consumption of Fish, non-spill, adult male	1.08E-05	1.08E-06	2.17E-05
Consumption of Fish, non-spill, subsistence populations	5.28E-05	5.28E-06	1.06E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.38E-04	1.09E-04	3.77E-03
Contaminated Vegetation	3.27E-03	2.27E-04	2.73E-02
Consumption of Water, adult male	8.23E-07	9.60E-08	1.48E-06
Consumption of Fish, adult male	6.17E-09	1.03E-09	9.26E-09
Consumption of Fish, subsistence population	5.21E-08	8.68E-09	7.81E-08

Maximum application rate at .05 ai. lb./ac

Table 12. Summary of Public Exposure Scenarios for Clopyralid

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.92E-03	3.16E-04	1.23E-02
Direct Spray, feet and lower legs, woman	1.93E-04	3.17E-05	1.24E-03
Water Consumption, spill, child	7.17E-03	3.49E-04	2.35E-02
Fish Consumption, spill, adult male	2.15E-04	1.72E-05	4.70E-04
Fish Consumption, spill, subsistence populations	1.05E-03	8.37E-05	2.29E-03
Dermal Exposure, contaminated vegetation	1.85E-04	3.85E-05	8.85E-04
Contaminated Fruit	1.65E-03	7.53E-04	2.61E-02
Contaminated Vegetation	2.27E-02	1.58E-03	1.89E-01
Swimming, one hour, adult female	1.26E-09	8.13E-11	1.68E-08
Contaminated Water, non-spill, child	2.11E-04	3.21E-05	1.11E-03
Consumption of Fish, non-spill, adult male	6.32E-06	1.58E-06	2.21E-05
Consumption of Fish, non-spill, subsistence populations	3.08E-05	7.70E-06	1.08E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	6.64E-04	2.42E-04	1.38E-02
Contaminated Vegetation	9.15E-03	5.07E-04	9.95E-02
Consumption of Water, adult male	2.80E-05	2.80E-06	6.24E-05
Consumption of Fish, adult male	1.40E-07	2.00E-08	2.60E-07
Consumption of Fish, subsistence population	1.13E-06	1.62E-07	2.11E-06

*Applied at the Maximum Application Rate of 0.14 a.e. lbs./Acre.

Table 13. Summary of Public Exposure Scenarios for Glyphosate

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.78E-02	4.53E-03	5.80E-02
Direct Spray, feet and lower legs, woman	1.79E-03	4.55E-04	5.83E-03
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.17E-03	9.35E-05	2.60E-03
Fish Consumption, spill, subsistence populations	5.70E-03	4.56E-04	1.27E-02
Dermal Exposure, contaminated vegetation	2.19E-03	6.98E-04	5.31E-03
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	8.71E-09	2.54E-10	2.76E-07
Water Consumption, non-spill, child	1.65E-03	1.19E-04	1.87E-02
Consumption of Fish, non-spill, adult male	1.89E-05	2.23E-06	1.42E-04

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Consumption of Fish, non-spill, subsistence populations	9.20E-05	1.09E-05	6.94E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	3.76E-03	1.72E-03	5.97E-02
Contaminated Vegetation	5.18E-02	3.60E-03	4.32E-01
Consumption of Water, adult male	1.09E-05	3.52E-06	3.98E-04
Consumption of Fish, adult male	2.06E-08	9.55E-09	6.30E-07
Consumption of Fish, subsistence population	1.67E-07	7.74E-08	5.10E-06

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

Table 14. Summary of Public Scenarios for Imazapyr: chopper

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.95E-02	6.38E-03	8.30E-02
Direct Spray, feet and lower legs, woman	1.96E-03	6.41E-04	8.34E-03
Water Consumption, spill, child	4.18E-02	2.08E-03	1.69E-01
Fish Consumption, spill, adult male	6.28E-04	5.13E-05	1.69E-03
Fish Consumption, spill, subsistence populations	3.06E-03	2.50E-04	8.22E-03
Dermal Exposure, contaminated vegetation	8.19E-04	3.30E-04	2.11E-03
Contaminated Fruit	3.88E-03	1.77E-03	6.16E-02
Contaminated Vegetation	5.35E-02	3.71E-03	4.46E-01
Swimming, one hour, adult female	9.76E-08	2.20E-11	2.49E-06
Contaminated Water, non-spill, child	4.96E-04	1.36E-07	9.68E-03
Consumption of Fish, non-spill, adult male	7.45E-06	3.35E-09	9.68E-05
Consumption of Fish, non-spill, subsistence populations	3.63E-05	1.63E-08	4.72E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	1.63E-03	4.20E-04	2.98E-02
Contaminated Vegetation	2.25E-02	8.79E-04	2.15E-01
Consumption of Water, adult male	6.60E-05	1.98E-08	1.36E-03
Consumption of Fish, adult male	1.65E-07	7.07E-11	2.83E-06
Consumption of Fish, subsistence population	1.34E-06	5.73E-10	2.29E-05

*Applied at the Maximum Application Rate of .33 a.e. lbs./Acre.

Table 15. Summary of Public Exposure Scenarios for Sulfometuron methyl

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	6.70E-04	1.17E-04	3.91E-03
Direct Spray, feet and lower legs, woman	6.73E-05	1.17E-05	3.93E-04
Water Consumption, spill, child	7.17E-03	3.49E-04	2.35E-02
Fish Consumption, spill, adult male	6.46E-04	5.15E-05	1.41E-03
Fish Consumption, spill, subsistence populations	3.15E-03	2.51E-04	6.87E-03
Dermal Exposure, contaminated vegetation	6.50E-05	1.42E-05	2.87E-04
Contaminated Fruit	1.65E-03	7.53E-04	2.61E-02
Contaminated Vegetation	2.27E-02	1.58E-03	1.89E-01
Swimming, one hour, adult female	1.89E-10	4.44E-12	9.61E-09
Water Consumption, non-spill, child	1.05E-05	3.85E-07	3.16E-04
Consumption of Fish, non-spill, adult male	9.48E-07	5.69E-08	1.90E-05
Consumption of Fish, non-spill, subsistence populations	4.62E-06	2.77E-07	9.24E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.63E-04	1.20E-04	4.18E-03
Contaminated Vegetation	3.63E-03	2.52E-04	3.02E-02
Consumption of Water, adult male	1.60E-07	2.80E-08	3.36E-07
Consumption of Fish, adult male	5.60E-09	1.40E-09	9.80E-09
Consumption of Fish, subsistence population	4.54E-08	1.13E-08	7.94E-08

Maximum application rate at .14 ai. lb./ac

Table 16. Summary ofPublic Scenarios for Triclopyr TEA

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	3.83E-02	1.04E-02	1.51E-01
Direct Spray, feet and lower legs, woman	3.85E-03	1.05E-03	1.51E-02
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	4.68E-03	1.61E-03	1.36E-02
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	3.80E-08	5.28E-12	6.84E-06
Contaminated Water, non-spill, child	4.51E-04	9.17E-08	5.41E-02
Consumption of Fish, non-spill, adult male	8.13E-07	2.71E-10	6.50E-05

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Consumption of Fish, non-spill, subsistence populations	3.96E-06	1.32E-09	3.17E-04
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	9.14E-03	2.78E-03	2.51E-01
Contaminated Vegetation	3.22E-02	9.38E-04	6.39E-01
Consumption of Water, adult male	5.71E-05	8.00E-12	4.11E-03
Consumption of Fish, adult male	1.71E-08	3.43E-15	1.03E-06
Consumption of Fish, subsistence population	1.39E-07	2.78E-14	8.33E-06

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre.

Table 17. Summary of Public Scenarios for Triclopyr BEE

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	1.35E-01	4.18E-02	4.68E-01
Direct Spray, feet and lower legs, woman	1.35E-02	4.20E-03	4.70E-02
Water Consumption, spill, child	1.02E-01	5.00E-03	3.42E-01
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	1.61E-02	6.36E-03	3.96E-02
Contaminated Fruit	2.35E-02	1.08E-02	3.73E-01
Contaminated Vegetation	3.24E-01	2.25E-02	2.70E+00
Swimming, one hour, adult female	2.75E-06	5.23E-10	4.12E-04
Contaminated Water, non-spill, child	6.02E-05	1.38E-08	6.77E-03
Consumption of Fish, non-spill, adult male	1.08E-07	4.06E-11	8.13E-06
Consumption of Fish, non-spill, subsistence populations	5.28E-07	1.98E-10	3.96E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	9.14E-03	2.78E-03	2.51E-01
Contaminated Vegetation	2.13E-02	3.97E-04	6.39E-01
Consumption of Water, adult male	1.14E-07	8.00E-13	4.80E-06
Consumption of Fish, adult male	3.43E-11	3.43E-16	1.20E-09
Consumption of Fish, subsistence population	2.78E-10	2.78E-15	9.72E-09

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

Table 18. Summary of Public Scenarios for Triclopyr (TCP)

Scenario	Typical Dose (mg/kg/day)	Lower Range (mg/kg/day)	Upper Range (mg/kg/day)
Acute/Accidental Exposures (dose in mg/kg/day)			
Direct Spray, entire body, child	N/A		
Direct Spray, feet and lower legs, woman	N/A		
Water Consumption, spill, child	4.36E-04	8.53E-06	2.49E-03
Fish Consumption, spill, adult male	1.85E-04	1.48E-05	4.10E-04
Fish Consumption, spill, subsistence populations	8.99E-04	7.19E-05	2.00E-03
Dermal Exposure, contaminated vegetation	N/A		
Contaminated Fruit	3.35E-03	1.53E-03	5.31E-02
Contaminated Vegetation	4.61E-02	3.20E-03	3.84E-01
Swimming, one hour, adult female	7.13E-06	4.96E-11	3.55E-04
Contaminated Water, non-spill, child	1.35E-04	9.17E-10	6.32E-03
Consumption of Fish, non-spill, adult male	2.44E-07	2.71E-12	7.58E-06
Consumption of Fish, non-spill, subsistence populations	1.19E-06	1.32E-11	3.70E-05
Chronic/Longer Term Exposures (dose in mg/kg/day)			
Contaminated Fruit	2.74E-03	9.81E-04	5.15E-02
Contaminated Vegetation	1.24E-02	3.60E-04	2.31E-01
Consumption of Water, adult male	7.52E-06	2.75E-13	4.51E-04
Consumption of Fish, adult male	8.57E-10	5.14E-17	3.43E-08
Consumption of Fish, subsistence population	6.94E-09	4.17E-16	2.78E-07

*Applied at the Maximum Application Rate of 2 a.e. lbs./Acre

2.4 RISK ANALYSIS

This risk analysis was accomplished by comparing the dose levels estimated in the exposure analysis combined with the toxic effect levels described in the hazards analysis.

The potential risks associated with the use of herbicides prescribed for this project are minimal. Project specific BMP's further insure that risks will be minimized.

2.4.1 Aminopyralid (Milestone)

2.4.1.1 Workers

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of Milestone in the VIWMP is not expected to result in an exposure that would approach a level of concern.

2.4.1.2 Public

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of Milestone in the VIWMP is not expected to result in an exposure that would approach a level of concern.

2.4.2 Chlorsulfuron (Telar XP)

2.4.2.1 Workers

Given the extremely low hazard quotients of both accidental and general exposure, the risk is deemed extremely low. None of the exposure levels approach a level of concern. Proposed use of chlorsulfuron in the plan is not expected to result in an exposure that would approach a level of concern.

2.4.2.2 Public

It is deemed unlikely that the public will be exposed to chlorsulfuron at a level of concern. All the acute exposure scenarios are below a level of concern. Of the longer term (chronic) scenarios, the long-term consumption of contaminated vegetation after application of the highest dose yields a hazard quotient that is greater than 1 (HQ=1.4). The scenario for the longer-term exposure to contaminated vegetation is also an extremely conservative assumption. The individual would need to be in contact with a considerable amount of the vegetation for an extended period on an annual basis.

2.4.3 Clopyralid (Transline)

Clopyralid as Transline will be prescribed and applied as one component of the plan. Certain scenarios may result in exposures that exceed levels of concern.

2.4.3.1 Workers

In the projected scenarios, hazard quotients for all potential exposures are well below a level of concern. It is expected that actual exposure levels will be below a level of concern> BMPS and protection measures and BMPs will further mitigate against exposure.

2.4.3.2 Public

No scenarios exceed a level of concern. There is elevated risk that would result from a prolonged exposure to treated vegetation and the consumptions of contaminated fruit by an adult female. Significant exposure would require repeated exposure to vegetation immediately following application along with eating considerable fruit contaminated from annual applications to the same site.

Hexochlorobenzene

Hexochlorobenzene is a contaminant found in clopyralid and decomposition metabolites. It is recognized as a potential carcinogen. Therefore, human health risks must be assessed and taken into consideration. The EPA has established an RfD of .0008 mg/kg/day for this compound. Hexochlorobenzene is present in very small amounts in clopyralid: 2.5 ppm per unit of measure. The proposed rate of application for clopyralid is .14 pound AE/acre. The subsequent rate of Hexochlorobenzene is 2.5/1,000,000 x.14 or 3 $x10^{-7}$. This rate was used for the exposure assessments. There is no risk to aquatic or terrestrial wildlife and plants. Only human health assessments were completed.

2.4.4 Glyphosate (Aquamaster/Roundup Custom)

There are multiple risk assessment work sheets available for glyphosate. Two worksheets were used to complete this assessment. One worksheet assesses back pack applications using the more toxic formulation of Roundup which includes the surfactant polyethoxylated tallow amine (POEA). This sheet was chosen because it is the latest version and has the most accurate drift scenarios included. Also, there are terrestrial wildlife expose scenarios not included in other worksheets. The other sheet assesses the use of the less toxic formulation without surfactant. Surfactants added are considered minimally non-toxic, very different from POEA.This sheet includes the more accurate aquatic exposure assessments with the more accurate toxicity values. The more toxic formulation with POEA will not be use in this project. The least toxic formations will be prescribed. This will further mitigate risks associated with the use of Glyphosate.

2.4.4.1 Workers

Potential risk associated with the use of glyphosate is minimal. Potential exposure across rates and scenarios is well below the level of concern. It is anticipated that exposure will not reach a level of concern.

2.4.4.2 Public

Hazard quotients are, for the most part, well below a level of concern. One exposure scenario results in hazard quotients for accidental exposure that does exceed a level of concern. This scenario assumes an upper estimate of exposure. In a second scenario where consumption of contaminated vegetation by an adult female occurred at the highest level of exposure. This involves consumption of considerable vegetation, sprayed with herbicide, immediately following application. This is deemed an unlikely scenario. Herbicide applications will not occur to plants that produce fruit or vegetation that could be gathered for human consumption at a time when edible fruit/vegetation is present, areas receiving herbicide application will be posted to notify public of the application. People will be prohibited from entry until dry. Use of a SPI will alert the public to the presence of an herbicide application. Project specific BMPs will buffer application proximity to water. Mixing and loading will occur more than 200 feet from water and on average less than 30 gallons of herbicide will be mixed in backpacks at any one time. The batch truck will reamin on access roads and will be secured, which will reduce the chance for spills. The primary spill potential will be with applicators and backpacks, which will be a maximum of 30 gallons (if 10 workers wearing 3-gallon capacity backpacks spilled their contents).

2.4.5 Imazapyr (Stalker, Polaris, Habitat, Polaris SP)

2.4.5.1 Worker

Imazapyr is deemed unlikely to adversely affect applicators. Hazard quotients were well below the levels of concern for both general exposure and accidental exposure. Application methods, BMP's and buffers will insure that exposure levels of concern will not be met or exceeded.

2.4.5.2 Public

All hazard quotients are below a level of concern. Both direct spray and accidental exposure scenario hazard quotients are well below the level of concern. Those scenarios where the hazard quotient approaches, but remain below a level of concern include water consumption by a child, and the consumption of contaminated vegetation by an adult female. These scenarios are deemed very unlikely given the parameter of this project as described earlier.

2.4.6 Sulfometuron (Oust)

2.4.6.1 Worker and Public

Considering both chronic and acute exposure, all but one hazard quotients are well below the level of concern in all likely sulfometuron exposure scenarios for both applicators and the public. Chronic/long- term exposure assessments indicate levels that could exceed the RfD for an adult female who would repeatedly contact contaminated vegetation from a treatment site following a single application. The scenarios are conservative and represent the most likely and greatest potential for exposure. Specifically, this individual would need to consume freshly treated vegetation daily from the treatment site for a period of 90 days. The herbicides are typically dry within 1 hour and no longer a hazard. Additionally, Oust will be applied to the soil to maintain bare ground. Proposed applications and BMP's in the plan should further increase the margin of safety.

2.4.7 Triclopyr (TEA) (Garlon 3A)

Triclopyr (TEA), as Garlon 3A, will be prescribed and applied as one component of the program. Risk Assessments were conducted using the application rate will be 2 pound AE per acre. Certain scenarios may result in exposures that exceed levels of concern.

2.4.7.1 Workers

Hazard quotients for upper estimates of acute exposure are below a level of concern. Hazard quotients do exceed levels of concern for long term or chronic exposure at the highest anticipated level. This scenario is conservative and static. This assumes continual broadcast application for an 8-hour day for several days. Application conditions will vary greatly with each application at each location. Applicators applying daily for an extended period might be more likely to approach this level. Sporadic application frequencies, consistent with the anticipated applications for the UARP VIWMP plan are deemed unlikely to result in exposures that approach levels of concern.

2.4.7.2 Public

The RfD for an adult female of child bearing age is 0.05 mg/kg. This RfD value is one (1) for a child. Considering and the central estimates of acute exposure, only one scenario exceeded the RfD: a female contacting contaminated vegetation at the maximum projected exposure, hazard quotients for an adult women levels of concern for both acute and chronic effects. The most significant acute and chronic exposure was the result of an adult female contacting contaminated vegetation and situations where women consumes contaminated fruit. These scenarios are conservative as they require these individuals be present at the time of application and would have to contact/consume all treated vegetation immediately after application. The public will be prohibited from entry until after the applications and the herbicides have dried. The chronic risk would result from a prolonged exposure to treated vegetation. This scenario is not deemed plausible considering that much of the area is remote and not used significantly for recreation. It is important to understand that significant exposure would require repeated exposure to vegetation or consumption of vegetation immediately following application. This scenario also assumes that the same vegetation is repeatedly treated, which will not occur.

2.4.8 Triclopyr (BEE) (Garlon 4 Ultra)

2.4.8.1 Workers

Incidental exposure scenarios triclopyr ester suggest that exposure from contaminated gloves can be significant with one or more hours of exposure. Hazard quotients for general chronic exposure exceed a level of concern for the upper level application volumes when applications are made via back pack. These risk assessments consider broadcast backpack foliar applications. Proposed Project use of triclopyr ester will be limited to specific spot treatments and would not include broadcast applications. Low-volume basal and cut stump methods are proposed as well. Basal and cut-stump applications are made to the lower 12 inches of the target plant stems. Drift is minimal to non-existent with this method compared to foliar applications.

2.4.8.2 Public

Six scenarios project hazard quotients exceeding levels of concern. Two occur with the central, and four occur with the upper exposure estimate levels. They involve contact with or the consumption of fruit and vegetation immediately following application. Three are non-accidental acute exposure. An additional three consider the long-term risks. These scenarios are conservative and not likely to occur. The public will be prohibited from entry until the herbicides have dried after the applications mitigating against contact contamination. Chronic risk would result from a prolonged, repeat exposure to and consumption of treated vegetation. Significant exposure would require repeated (several consecutive days) contact with vegetation following application. This scenario is highly unlikely considering that much of the proposed treatment area is remote and only used intermittently for recreation. Basal applications are made at a time of year when no foliage is present on the target plants for the public to contact, and no fruit is present on the plants to eat. Additionally, the scenarios require that individuals are present at the time of application and contact vegetation immediately after application.

2.4.9 Triclopyr TCP Metabolite

This assessment considers the risk of exposure from the metabolite TCP, a breakdown component of triclopyr. Only those long-term scenarios where TCP could present a risk are considered. The explanation is found on tab (Chemical notes) of the TCP MS Excel spread sheet, SERA 2017i). All worksheets regarding worker exposure are removed along with direct exposure scenarios for the public. The maximum application rate reflects the prescribed use of Garlon 3A (Triclopyr (TEA)), 2.0 pounds AE. Garlon 3A will be the most commonly used formulation and is most representative of the project and the potential exposure from triclopyr.

2.4.9.1 Workers

There are no scenarios or subsequent data for TCP for workers.

2.4.9.2 Public

Exposure assessments for the general public consider exposure to vegetation, water, fruit, and fish contaminated with triclopyr and subsequently the metabolite TCP. 15 scenarios project Hazard Quotient (HQs) well above a level of concern. At the central and upper levels of application volume, adult females are at risk from the consumption of contaminated fruits and vegetation and prolonged exposure to contaminated vegetation. These scenarios assume prolonged exposure and the consumption of considerable amounts of fruit or water contaminated by the TCP. Consumption and exposure scenarios are acute, conservative, and consider significant levels of exposure and consumption in only the highest level of exposure estimates.

2.5 SUMMARY OF RISK ANALYSIS TO WORKERS

Tables 19 and 20 illustrate that several of the exposure scenarios for workers approach or exceed a level of concern (i.e. are greater than one), involving the use of triclopyr (TEA and BEE). Considering the upper levels of potential exposure from both formulations of triclopyr, there is a long term risk to workers. However, considering acute exposure levels resulting from proposed application rates, there is no elevated risk from the use of triclopyr (TEA formulations). Considering acute risk with the use of triclopyr, there is a level of concern with the proposed application rate for this project. This risk is from the upper application range of immersion of the herbicide on the hands for 1 minute, for immersion of the herbicide on a contaminated glove for an hour and for both 1 hour spill scenarios. Based on the values for aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr and sulfometuron methyl the risk characterization for workers is considered negligible. This implies that even under the maximum proposed application rates, workers can apply aminopyralid, chlorsulfuron clopyralid, glyphosate, imazapyr and sulfometuron methyl over the long-term without any expected toxic effects. It also implies that even under the most conservative set of accidental exposures (which should be infrequent events) workers will not face an unacceptable level of risk. All of these chemicals can cause irritation and damage to the skin and eyes with prolonged exposure to the concentrate; however, these effects can be minimized or avoided by safe handling practices and the use of personal protective equipment such as eye protection.

Table 19. Hazard Quotients for Backpack Applicators from General (Non-Accidental) Exposures to Aminopyralid, Clopyralid, Glyphosate, Imazapyr and Triclopyr (TEA and BEE formulations)

Chemical	Hazard Quotient[a,b]		
	Typical Exposure levels	Lower Exposure levels	Upper Exposure Levels
Aminopyralid	0.003	.0001	0.02
Chlorsulfuron	3E-03	7E-05	3E-02
Clopyralid	0.02	4E-04	7E-02
Glyphosate	1E-02	5E-04	8E-02
Imazapyr(chopper)	2E-03	6E-05	1E-02
Sulfometuron methyl	9E-02	3E-03	0.6
Triclopyr (TEA)	0.5	2E-02	3
Triclopyr (BEE)	1.0	0.05	12

a Hazard Quotient is the level of exposure divided by the RfD (reference dose), then rounded to one significant digit.
b in these analyses, data are displayed for three different exposure scenarios: typical, lower, and upper. The upper level represents a conservative estimate of a worst-case scenario resulting from the highest application rate, lowest dilution rate, and largest number of acres treated per day.

Table 20. Hazard Quotient for Herbicides (Backpack Applicators) from Accidental/Incidental Exposures to Lower and Upper Application Rates

Chemical	Hazard Quotient[a]							
	Immersion of Hands(gloves) (1 minute)		Contaminated Gloves (1 hour)		Spill on Hands (1 hour)		Spill on Lower Legs (1 hour)	
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Aminopyralid	2E-08	7E-07	1E-06	4E-05	1E-06	2E-04	1E-05	5E-04
Chlorsulfuron	1E-07	2E-06	9E-06	1E-04	3E-06	1E-04	8E-06	3E-04
Clopyralid	8E-08	2E-06	5E-06	1E-04	1E-05	4E-04	3E-05	1E-03
Glyphosate	4E-07	1E-05	2E-05	6E-04	6E-05	8E-04	1E-04	2E-03
Imazapyr(chopper)	9E-06	7E-05	5E-04	4E-03	7E-05	9E-04	2E-04	2E-03
Sulfometuron methyl	3E-07	3E-06	2E-05	2E-04	4E-06	1E-04	9E-06	3E-04
Triclopyr (TEA) Formulation	2E-05	2E-04	1E-03	1E-02	3E-04	4E-03	7E-04	1E-02
Triclopyr (BEE)	1E-02	8E-02	0.8	**5**	1E-03	1E-02	3E-03	3E-02

[a] Hazard Quotient is the level of exposure divided by the RfD (reference dose), then rounded to one significant digit.

2.6 SUMMARY OF RISK ANALYSIS TO GENERAL PUBLIC

2.6.1 Direct Spray

Table 21 displays the hazard quotients for the direct spray scenarios. No levels exceed concern. While it is plausible that a child or woman may be passing by during application of the herbicides and could receive exposure, it is unlikely that they would receive direct spray. This is because one or the other party involved (a woman and child, and an applicator) would most likely notice and avoid the other party. This would minimize any exposure, and would not likely result in direct spray to the whole body of a child, or to the feet and lower legs of a woman.

Table 21. Hazard Quotient for the Public—Direct Spray Scenario

Chemical	Hazard Quotient[a]					
	Child (whole body)			Woman (feet and lower legs)		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid	.001	2E-04	0.008	.0001	2E-05	6E-04
Chlorsulfuron	8E-04	1E-04	5E-03	8E-05	1E-05	5E-04
Clopyralid	3E-03	4E-04	2E-02	3E-04	4E-05	2E-03
Glyphosate	9E-03	2E-03	3E-02	9E-04	2E-04	3E-03
Imazapyr	8E-03	3E-03	3E-02	8E-04	3E-04	3E-03
Sulfometuron Methyl	8E-04	1E-04	4E-03	8E-05	1E-05	5E-04
Triclopyr (TEA)	4E-02	1E-02	0.2	8E-02	2E-02	0.3
Triclopyr (BEE)	0.1	4E-02	0.5	0.3	8E-02	0.9

[a] Hazard Quotient is the level of exposure divided by the reference dose (RfD), then rounded to one significant digit.

2.6.2 Contaminated Vegetation

Table 22 demonstrates that, for members of the general public that may contact vegetation sprayed with any of the proposed herbicides, there is a negligible level of exposure risk.

Table 22. Hazard Quotient for the Public—Contact with Vegetation Sprayed with Herbicides

Chemical	Hazard Quotient[a]		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid	1E-04	2E-05	6E-04
Chlorsulfuron	7E-05	1E-05	3E-04
Clopyralid	2E-04	5E-05	1E-03
Glyphosate	1E-03	3E-04	3E-03
Imazapyr	3E-04	1E-04	8E-04
Sulfometuron methyl	7E-05	2E-05	3E-04
Triclopyr (TEA) Formulation	0.09	0.03	0.3
Triclopyr (BEE)	0.3	0.1	0.8

[a] Hazard Quotient is the level of exposure divided by the reference dose (RfD), then rounded to one significant digit.

2.6.3 Contaminated Water

For the accidental spill scenarios, the exposure levels that approach the level of concern (i.e., HQ>1) are scenarios involving a child that consumes water contaminated with glyphosate at the upper level, and triclopyr (BEE & TEA formulation,) at proposed and upper levels of exposure (Table 23). A conservative aspect to the water contamination scenario is that it represents standing water, with no dilution or degradation of the herbicide. This is unlikely in a forested situation where flowing streams are more likely to be contaminated in a spill, rather than a standing pond of water. Nonetheless, this and other acute scenarios help to identify the types of scenarios that are of greatest concern and those that may warrant the greatest steps to mitigate.

Table 23. Hazard Quotient for the Public—Drinking Water Contaminated by Herbicides

Chemical	Hazard Quotient[a]					
	Acute-Spill Scenario (child)			Chronic Scenario (adult male)		
	Typical	Lower	Upper	Typical	Lower	Upper
Aminopyralid	6E-03	3E-04	2E-02	3E-04	4E-06	0.002
Chlorsulfuron	1E-02	5E-04	3E-02	4E-05	5E-06	7E-05
Clopyralid	1E-02	5E-04	3E-02	2E-04	2E-05	4E-04
Glyphosate	5E-02	2E-03	0.2	5E-06	2E-06	2E-04
Imazapyr	2E-02	8E-04	.1	.01	.00000001	.0008
Sulfometuron methyl	8E-03	4E-04	3E-02	8E-06	1E-06	2E-05
Triclopyr (TEA)	0.1	5E-03	0.3	1E-03	2E-10	8E-02
Triclopyr (BEE)	0.1	5E-03	0.3	2E-06	2E-11	1E-04
Triclopyr (TCP)	2E-02	3E-04	1E-01	7E-08	4E-15	3E-06

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

2.6.4 Oral Exposure from Contaminated Fish

For members of the general public, there is no unacceptable level of risk associated with consumption of fish caught from water contaminated with any of the herbicides proposed for use (see Table 24). The highest hazard quotient under these scenarios is 0.8, which was calculated using the upper application limits to represent the worst-case scenario; this value is below the level of concern (1.0) by a factor of 10.

Table 24. Hazard Quotient for the Public—Consumption of Fish Caught from Water Contaminated by Herbicides (Upper Limits are Presented to Represent the Worst-Case Scenario)

Chemical	Hazard Quotient[a]			
	Fish Consumption (accidental spill)		Chronic Fish Consumption	
	Adult Male	Subsistence Population	Adult Male	Subsistence Population
Aminopyralid	4E-04	2E-03	8E-06	7E-05
Chlorsulfuron	6E-04	3E-03	5E-07	4E-06
Clopyralid	6E-04	3E-03	2E-06	1E-05
Glyphosate	1E-03	6E-03	3E-07	3E-06
Imazapyr	7E-04	3E-03	1E-06	9E-06
Sulfometuron Methyl	2E-03	8E-03	5E-07	4E-06
Triclopyr (TEA) Formulation	4E-04	2E-03	2E-05	2E-04
Triclopyr (BEE)	4E-04	2E-03	2E-08	2E-07
Triclopyr (TCP)	2E-02	8E-02	3E-06	2E-05

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

2.6.5 Oral Exposure from Contaminated Vegetation

Table 25 displays the hazard quotient values for scenarios involving a woman eating contaminated fruit and vegetation shortly after spraying and for 90 days after they were sprayed. For aminopyralid, clopyralid and imazapyr, the hazard quotients under all rates of application are below the level of concern of 1. However, for glyphosate, in the case of acute exposure from eating contaminated vegetables at the upper application rate, the hazard quotient (1.4) exceeds the level on concern. Chlorsulfuron and sulfometuron methyl exposures exceed a level of concern when considering the risk from the long-term consumption of vegetation treated at the highest rates. Considering the use of Telar as a pre-emergent, this scenario is unlikely. For triclopyr (TEA formulation), in the case of acute and chronic exposure from eating contaminated fruit at the upper application rate, the hazard quotients (7 and 5 respectively) exceed the level of concern. In the case of acute exposure from eating contaminated vegetation, the hazard quotients of the typical and upper application rates (6 and 54 respectively and 108 for TCP) exceed the level of concern. In the case of chronic exposure from eating contaminated vegetation, only the hazard quotient (13, TCP 53) of the upper application rate exceeds the level of concern. For triclopyr (BEE formulations), in the case of acute and chronic exposure from eating contaminated fruit at the upper application rate, the hazard quotients (7 and 5 respectively) exceed the level of concern. In the case of acute exposure from eating contaminated vegetation, the hazard quotients of the typical and upper application rates (6 and 54 respectively) exceed the level of concern. In the case of chronic exposure from eating contaminated vegetation, only the hazard quotient (13) of the upper application rate exceeds the level of concern. TCP mirrors both formulations with a slightly lower set of HQ’s that exceed; levels of concern when considering these exposure scenarios.

Table 25. Hazard Quotient for the General Public—Ingesting Fruit and Vegetation Contaminated by Herbicides

Chemical	Hazard Quotient[a]					
	Acute Exposure			Chronic Exposure		
	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate	Typical Exposure Rate	Lower Exposure Rate	Upper Exposure Rate
Aminopyralid						
Fruit	0.001	6E-04	0.02	6E-04	2E-04	0.01
Vegetation	0.02	0.001	0.1	0.008	4E-04	0.08
Chlorsulfuron						
Fruit	2E-03	1E-03	4E-02	1E-02	6E-03	0.2
Vegetation	3E-02	2E-03	0.3	0.2	1E-02	1.4
Clopyralid						
Fruit	2E-03	1E-03	3E-02	4E-03	2E-03	9E-02
Vegetation	3E-02	2E-03	0.3	6E-02	3E-03	0.7
Glyphosate						
Fruit	1E-02	5E-03	0.2	2E-03	9E-04	3E-02
Vegetation	0.2	1E-02	1.4	0.03	0.002	0.2
Imazapyr; Chopper						
Fruit	2E-03	7E-04	2E-02	7E-04	2E-04	1E-02
Vegetation	2E-02	1E-03	0.2	9E-03	4E-04	9E-02
Sulfometuron Methyl						
Fruit	2E-03	9E-04	3E-02	1E-02	6E-03	0.2
Vegetation	3E-02	2E-03	0.2	0.2	1E-02	1.5
Triclopyr (TEA)						
Fruit	0.5	0.2	7	0.2	0.06	5
Vegetation	6	0.5	54	0.6	0.02	13
Triclopyr (BEE)						
Fruit	0.5	0.2	7	0.2	0.06	5
Vegetation	6	0.5	54	0.4	0.008	13
TCP						
Fruit	0.1	6E-02	**2**	0.2	8E-02	**4**
Vegetation	**1.8**	0.1	**15**	**1**	3E-02	**19**

[a] Hazard Quotient is the level of exposure divided by the Reference Dose (RfD), then rounded to one significant digit.

These hazard quotients illustrate that there is some variability regarding the potential effects of consuming contaminated fruit and vegetation; however, considering that these hazard quotients are near the level of concern, it is unlikely that adverse health effects would result in most of these scenarios. The exception is the case of acute exposure at the upper application rate in which it exceeds the level of concern and likely that adverse health effects would result. It is also important to take into account the fact that these scenarios do not include the mitigative effects of washing contaminated vegetation. The blue dye that will be added to the herbicide would most likely deter most adults from consuming contaminated vegetation. Also, after treatment, vegetation would show obvious signs of herbicide effects and would likely be undesirable for consumption.

2.6.6 Risk Assessment Summary

The risk characterization for workers is reasonably simple and unambiguous; based on a generally conservative and protective set of assumptions regarding both the toxicity of the proposed chemicals and the potential exposures, there is no basis for suggesting that adverse effects are likely in workers at the typical application rates for the Proposed Action for aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr sulfometuron methyl and triclopyr (TEA formulation) (SERA 2017). However, from the typical application rate of triclopyr (BEE formulation), there is a slight risk to workers from wearing contaminated gloves for one hour and a general risk from long term repeated application of and exposure to the herbicide and its metabolite. However, it is not reasonable to assume or postulate that the hands or any other part of a worker will be immersed in a solution of an herbicide for any period. On the other hand, contamination of gloves or other clothing is quite plausible. For this exposure scenario, the key element is the assumption that wearing gloves grossly contaminated with a chemical solution is equivalent to immersing the hands in a solution. In either case, the concentration of the chemical in solution that is in contact with the surface of the skin and the resulting dermal absorption rate are essentially constant. From a practical perspective, the most likely accidental exposure for workers (i.e. one that might require medical attention) may involve accidental contamination of the eyes. All of the proposed chemicals can cause irritation and damage to the skin and eyes; however, these effects can be minimized or avoided by safe handling practices and the use of personal protective equipment such as eye protection.

For members of the general public, aminopyralid, clopyralid, and imazapyr applications would result in a negligible risk under all of the scenarios. Even at the highest application rate of 0.11, 0.14 and .33 lb. a.e./acre, respectively, the hazard quotients are below the level of concern.

Glyphosate applications would result in exposure levels that slightly exceed the level of concern (i.e. a hazard quotient greater than one) in only one scenario involving the general public consuming contaminated vegetation with glyphosate (upper application rate). Similar risk is assigned to chlorsulfuron and sulfometuron methyl. Under normal circumstances, it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with the proposed herbicides. One exception to this could be plants collected by Native Americans for basket weaving or medicinal use. However, in most instances, particularly for longer-term scenarios, treated vegetation would probably show signs of damage from herbicide exposure, thereby reducing the likelihood of consumption that would lead to significant levels of human exposure.

Additionally, as part of the project design criteria, in areas in which members of the general public might consume vegetation/fruit where herbicides are intended to be used, applications would be made once the fruit has deteriorated and dried up (senesced) and is no longer edible, typically in Mid-October. Chlorsulfuron and sulfometuron methyl are proposed primarily for pre-emergent weed control. Contamination of edible fruit or vegetation is highly unlikely.

For triclopyr (TEA formulation), the general public scenarios that exceed the level of concern of a hazard quotient above 1 were the scenarios involving short term/long term exposure from consumption of contaminated fruits and/or vegetation. Under normal circumstances it is extremely unlikely that humans will consume, or otherwise place in their mouths, vegetation contaminated with the proposed herbicides. Additionally, as part of the project design criteria, in areas in which members of the general public might consume vegetation/fruit where herbicides are intended to be used the vegetation would be treated prior to berry formation or fruit being present. Follow-up herbicide applications would be made once the fruit has deteriorated and dried up (senesced) and is no longer edible, typically in Mid-October. The intent for the specific timing on these two applications is to reduce the risk of the public consuming herbicide treated vegetation/fruit.

2.7 RISK CHARACTERIZATION FOR ADJUVANTS

2.7.1 Competitor (Source: Bakke 2007)

Competitor may be used as a surfactant with any of the proposed herbicides for this project, or as a diluent with Imazapyr or Triclopyr (BEE). Competitor has been assigned a “caution” signal word and the label indicates that improper use may cause irritation to the skin and eyes. The main ingredient in Competitor is an esterified vegetable oil. It also contains two emulsifiers, sorbitan alkylpolyethoxylate ester and dialkyl polyethoxylene glycol. Vegetable oil surfactants are gaining in popularity due to their capability to increase herbicide absorption and spray retention (Bakke 2007). The U.S. Food and Drug Administration (FDA) considers methyl and ethyl esters of fatty acids produced from edible fats and oils to be food grade additives (21 CFR 172.225). However, because of the lack of exact ingredient statements on these surfactants, it is not always clear whether the oils used meet the U.S. FDA standard None of the ingredients in this product are known to be on EPA List 1 or 2. Its primary ingredient is food-grade ethylated canola oil. Manufacture labels recommend using 0.25-1% surfactant mixed with the herbicide.

2.7.2 Toxicological and Environmental Characteristics of Spray Pattern Indicators containing Blue Acid 9

2.7.3.1 Background

Spray Pattern Indicators (SPI’s) are used extensively in crop and non-crop agriculture and in the industrial non-crop vegetation management markets. These materials are also used in the turf and landscape markets. SPI's insure the accurate and responsible application of herbicides. In addition, SPI's allow applicators to determine if drift or runoff is an occurring. SPI's also alert the public to an application, thus avoiding accidental or unintended exposure (USDA Forest Service, SERA Risk Assessments 2003; UK Forest commission report, 2007). SPI's are available in a variety of colors. The most common color is blue. Many of these blue-patterned indicators have various concentrations of the pigment identified as Blue acid 9. Blue acid 9 is the pigment in two pattern indicators commonly used in California, which go by the trade names of Blazon Blue and Hi-Light. These will be the focus of this discussion.

2.7.3.2 Physical and Chemical Properties

Both Blazon and Hi-Light are very water soluble and not considered persistent. Upon application to the soil, the SPI dissociates from the herbicide treatment. The SPI is then subject to photo- degradation and exhibits dissolution in the event of rain. When applied at labeled rates, these SPI's are expected to degrade completely within 7 days, however doubling the concentration (application rate) can extend the visibility of the SPI for an additional 7 to 10 days. One significant difference between Blazon and Hi-Light is the formulation. Hi-light is blue acid pigment formulated to create a concentrated SPI. Blazon is a polymeric color agent. The chromaphor (color portion) is encapsulated in a polymer. This encapsulation allows for coloring, but resulting in a marker that is non-staining, more water soluble and is less persistent in the environment. The encapsulation also renders the pigment inert, further reducing potential environmental impacts. These materials are designed to be short-lived providing adequate evidence of application without persistence.

2.7.3.3 Toxicological properties

SPI's are not regulated as a pesticide. As such, toxicological and environmental data on formulated products is limited. However, there is information on the colorant Acid blue 9 and the active ingredient and formulated products including, Aquashade an aquatic pesticide as well as Blazon and Bullseye spray pattern indicators. Aquashade is considered a pesticide. Its intended use is aquatic vegetation control via shading. Blue Acid 9 is used extensively in the production of detergents, soaps, cosmetics, and other consumer goods including food products Below is a table with basic toxicological information on select SPI's. While technical data is not readily available literature suggests that there is little risk to the public or the environment from Blue Acid 9 and those SPI's that contain this pigment.

Table 26. Aquatic Toxicity for Spray Pattern Indicators

Product	Oral Toxicity	Dermal Toxicity	NOAEL*	Hazard Classification	Aquatic Toxicity
Acid Blue 9	>2000	4600	>600 rat	Food Grade	>300
Aquashade	>2000	NA	>5000 mice	Aquatic label; caution	> 1000

Blazon	>5000	Mild irritant	NA	Caution	NA

*No observed adverse effect level

The USDA Forest Service has evaluated the risk to both the applicator and the public from the use of colorants (SERA, 1997). They found the protective benefits of the use outweighed any risk associated with use.

2.7.3.4 Sensitive Individuals

The Uncertainty Factor (UF) is used in the development of the RfD, which accounts for much of the variation in human response. This is a factor of 10 and is sufficient to ensure that most people will experience no toxic effects. "Sensitive" individuals are those that might respond to a lower dose than average, which includes women and children. The National Academy of Sciences report entitled, “Pesticides in the Diets of Infants and Children” (NAS, 1993) found that quantitative differences in toxicity between children and adults are usually less than a factor of approximately ten-fold. A Margin of Safety (MOS) of 100 may not cover individuals that may be sensitive to herbicides because human susceptibility to toxic substances can vary by two to three orders of magnitude. Factors affecting individual susceptibility include diet, age, heredity, pre-existing diseases, and lifestyle. Individual susceptibility to the herbicides proposed in this project cannot be specifically predicted. Unusually sensitive individuals may experience effects even when the MOS is equal to or greater than 100.

Women of child-bearing age and children are expected to be at greater risk from the exposure of certain herbicides such as Triclopyr (BEE) (SERA, 2011c).

2.8 CONNECTED ACTIONS

2.8.1 Synergistic Effects (Bakke 2007)

Synergistic effects are those effects resulting from exposure to a combination of two or more chemicals that are greater than the sum of the effects of each chemical alone (additive). Refer to USDA (1989, as referenced in USDA 2003) for a detailed discussion on synergistic effects.

It is not anticipated that synergistic effects would be seen with the additives proposed in this Plan. Based on a review of several recent studies, there is no demonstrated synergistic relationship between herbicides and surfactants (Abdelghani et al 1997; Henry et al 1994; Lewis 1992; Oakes and Pollak 1999, 2000 as referenced in Bakke 2007).

Although the combination of surfactant and herbicide might indicate an increased rate of absorption through the skin, a review of recent studies indicates this is not often true (Ashton et al 1986; Boman et al 1989; Chowan and Pritchard 1978; Dalvi and Zatz 1981; Eagle et al 1992; Sarpotdar and Zatz 1986; Walters et al 1993, 1998; Whitworth and Carter 1969 as referenced in Bakke 2007). For a surfactant to increase the absorption of another compound, the surfactant must affect the upper layer of the skin. Without some physical effect to the skin, there will be no change in absorption as compared to the other compound alone. The studies indicate that in general non-ionic surfactants have less of an effect on the skin, and hence absorption, then anionic or cationic surfactants. Compound specific studies indicate that the alkylphenol ethoxylates generally have little or no effect on absorption of other compounds. In several studies, the addition of a surfactant decreased the absorption through the skin. It would appear that there is little support for the contention that the addition of surfactants to herbicide mixtures would increase the absorption through the skin of these herbicides.

2.8.2 Cumulative Effects

The proposed use of herbicides could result in cumulative doses of herbicides to workers or the general public. Cumulative doses from the same herbicide result from: (1) additive doses resulting from various routes of exposure from this project, and (2) additive doses if an individual is exposed to other herbicide treatments.

Additional sources of exposure include: use of herbicides on adjacent private timberlands, use of herbicides on adjacent National Forest System lands, or home use by a worker or member of the general public. These herbicides are used for weed control throughout the county. Applications are random and seldom proximate. It is deemed unlikely that additional applications will be made consistently within one mile of the proposed treatment sites.

These herbicides are not persistent in the environment (i.e., generally half-lives of less than one year), do not bio accumulate, and are rapidly eliminated from the body if consumed or exposed to (SERA, WSSA, and Product MSDS Sheets). Additionally, herbicide application to a particular site will not be on an annual basis, but rather every 2 to 4 years. We do not anticipate any additive herbicide accumulation from re-treatment in following years or adjacent applications, as the project area is surrounded by National Forest and is not likely to be treated on an annual basis and the herbicides used will degrade within the year.

3.0 REFERENCES

Ando, C., L. Li, J. Walters, C. Gana, R. Segawa, R. Sava, T. Barry, P. Lee, S. Tran, J. White, J. Hsu, and K. Goh. 2002. Residues of Forestry Herbicides in Plants of Interest to Native Americans in California National Forests. December 2002.

Bakke, D. 2007. Analysis of issues Surrounding the Use of Spray Adjuvants with Herbicides. Original 2002, revision 2007. US Forest Service. http://www.fs.fed.us/r6/invasiveplant-eis

Department of Pesticide Regulation (DPR), 2001. National Forest Herbicide Monitoring Report, Progress Report #3 (Final Issue), Residues of Forestry Herbicides in Plants of Interest to California Tribes, May, 2001.

Goh, Kean S. 1999. Agricultural Program Supervisor IV; Preliminary Results of Surface Water Monitored for Forestry Herbicides in the Yurok Aboriginal Territory in the Klamath River Watershed. DPR. Spring 1999.

Guilherme Sousa Alves 1, João Paulo Arantes Rodrigues da Cunha 1(1)Universidade Federal de Uberlândia, Instituto de Ciências Agrárias,Campus Umuarama, Caixa Postal 593, CEP 38400902. Uberlândia, MG,Brazil. Email:guilhermeagro43@yahoo.com.br, jpcunha@iciag.ufu.br

National Academy of Sciences (NAS). 1993. Pesticides in the Diets of Infants and Children. NATIONAL ACADEMY PRESS. Washington, D.C. 1993.

Schuette, Jeff. 1998. Environmental Fate of Glyphosate. Environmental Monitoring and Pest Management. Department of Pesticide Regulation. Sacramento, CA. Accessed online on January 30, 2014 at: http://www.cdpr.ca.gov/docs/emon/pubs/fatememo/glyphos.pdf

Sierra Nevada Ecosystem Project. (SNEP). 1996. Final report to Congress. Sierra Nevada Ecosystems. Vol 1. Ch 1. http://ceres.ca.gov/snep/pubs/web/PDF/v1_ch01.pdf; USGS DDS-43, *Sierra Nevada*Ecosystems

Syracuse Environmental Research Associates, Inc. (SERA). 1997. Use and Assessment of Marker Dyes Used With Herbicides. Prepared for USDA Forest Service by Syracuse Environmental Research Associates, Inc. Syracuse, New York. Available at: http://www.fs.fed.us/foresthealth/pesticide/pdfs/091602_markerdyes.pdf

____. 2017a. Aminopyralid - Human Health and Ecological Risk Assessment Work Sheets. Syracuse Environmental Research Associates. SERA TR TR-052-04-04a.

____. 2017b. Chlorsulfuron - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA TR 05-43-23-05a. Version 6.01.06.

____. 2017c. Chopper, Backpack Directed Foliar: Imazapyr - Human Health and Ecological Risk Assessment Work sheets. Syracuse Environmental Research Associates. SERA Version 6.01.16

____. 2017d. Clopyralid - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. Version 6.01.16

____. 2017e. Glyphosate(less toxic forms) -Human Health and Ecological Risk Assessment Work Sheets. Syracuse Environmental Research Associates. Version 6.01.16

____. 2017f. Hexachlorpbenzene - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA TR 05-43-23-13a.Version 4.04. Version 6.01.16

____. 2007g. Risk assessments for select herbicides. Prepared for USDA Forest Service by Syracuse Environmental Research Associates, Inc. Syracuse, New York. 2007 through 2011. Available at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

____. 2017h. Sulfometuron Methyl - Human Health and Ecological Risk Assessment Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.06.

____. 2017i. TCP -Revised Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.00.01.

____. 2017j. Triclopyr BEE Formulations - Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.16

____. 2017k. Triclopyr TEA Formulations - Human Health and Ecological Risk Assessments Work Sheet. Syracuse Environmental Research Associates. SERA Version 6.01.16

U.K. Forestry Commission. 2007. “Using Dye Markers to Reduce Pesticide Use”. www.forestry.uk.gov

U.S. Department of Agriculture – Forest Service (USDA-FS). 2002. Analysis of issues surrounding the use of spray adjuvants with herbicides. Unpublished report, written by David Bakke. Pacific Southwest Regional Pesticide-Use Specialist. September 2002. 43 pp.

____. 2003. Herger-Feinstein Quincy Library Group Forest Recovery Act - Supplemental Environmental Impact Statement, Appendix G: Human Risk Assessment. Pacific Southwest Region, Lassen, Plumas and Tahoe National Forests. September 2003.

U.S. EPA. 1994. Draft Cleaner Technologies Substitutes Assessment (CTSA): Screen Reclamation Chemicals, Chapter 2. US Environmental Protection Agency, EPA 744R-94-005a, September 1994. http://www.epa.gov/dfe/pubs/screen/ctsa/ch02.html

U.S. EPA/OPP. 2005. U.S. EPA/OPP (U.S. Environmental Protection Agency/Office of Pesticide Programs) 2005b. Level 1Screening Ecological Risk Assessment for the Reregistration of Imazapyr.

U.S. EPA E-Docket EPA-HQ-OPP-2005-0495. EPA File Name: EPA-HQ-OPP-2005-0495-0009.pdf. Available at: www.regulations.gov.

____. 2007. U.S. EPA/OPP (U.S. Environmental Protection Agency/Office of Pesticide Programs) 2007a. Risks of Imazapyr Use to the Federally Listed California Red Legged Frog (Rana aurora draytonii), Pesticide Effects Determination. Includes Appendices A-K and Attachments 1 and 2. Documents dated July 20, 2007. Available at: http://www.epa.gov/espp/litstatus/effects/redleg- frog/#imazapyr.

Weed Science Society of America (WSSA). Herbicide Handbook. 10th edition. 2014.

Appendix B
Transmission Vegetation Management Procedure for the Upper American River Project Vegetation and Invasive Weed Management Plan

SMUD	TECHNICAL PROCEDURE	No. TP6602 Page i
		REV6 DATE: 6/14

CATEGORY

MAINTENANCE

SUBJECT

TRANSMISSION VEGETATION MANAGEMENT PROCEDURE

RECORD OF REVISIONS

1. Original Issue. 06/30/2004
2. Reformatted and Updated to meet NERC FAC-003-1 requirements, 9/7/2007
3. Changed title of Table 1 to read Table 2 and modified the table 2 to reflect only Clearance 2 clearances. Created new Table 1 to reflect new Clearance 1 species-specific clearance. 01/03/2008
4. Update to incorporate Title 14, California Code of Regulation and new standard format. Reformatted Table 1 and Table 2 replacing table notes with clarifying paragraphs. 02/2011
5. Document organized to conform to North American Transmission Forum Model Transmission Vegetation Management Procedure –TVMP. Reporting section expanded to include quarterly and outage reporting procedures. 10/2012
6. Document updated to meet NERC FAC-003-3 requirements, 6/27/2014

APPROVED BY:

7-16-14 Steve Hallmark DATE Program Manager, Vegetation Management	7/16/14 Ed LaBranch, DATE Mgr, T&D Line Design, Construction & Maintenance
7-16-14 Tony Deluca DATE Program Manager, T&D Engineering Assets	7/17/2014 Mike Rudek DATE Standards Administration

TABLE OF CONTENTS

NERC RELIABILITY STANDARD FAC-003-3 TO SMUD CROSS REFERENCE

	SMUD TVMP	Description
R1	Not Applicable	Applies to Generation Owners who own overhead transmission lines
R2	SMUD NERC Critical 230 kV list	Overhead transmission lines operated at 200kV or above
R2	Quarterly WECC Reports	Any encroachment (Types 1-4) into the Minimum Vegetation Clearance Distance (MVCD)
R3	1.5. Work Methods and Practice	Documented maintenance strategies or procedures
R3.1	5. Regulatory Clearance Requirements	Movement of applicable line conductors under their Rating and all Rated Electrical Operating Conditions
R3.2	1.7.3. In Cycle Pruning (Table 3)	Inter-relationships between vegetation growth rates, vegetation control methods, and inspection frequency.
R4	3.4.1. Vegetation Management	Notify the control center of a confirmed existence of a vegetation condition that is likely to cause a Fault at any moment.
R5	4. Imminent Threat Emergency Procedures	Constrained from performing vegetation work on an applicable line operating within its Rating and all Rated Electrical Operating Conditions, and the constraint may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan
R6	1.6. Inspections	Vegetation Inspection of 100% of its applicable transmission lines
R7	2. Annual Plan	Complete 100% of its annual vegetation work plan of applicable lines

(FAC) Facilities Design, Connections, and Maintenance

1. The Program

1.1. Purpose and Scope

This standard documents the Transmission Vegetation Management Procedure (TVMP) and supports compliance with regulatory requirements, and encompasses all transmission line vegetation management activities within the Sacramento Municipal District's (SMUD) transmission line rights-of-way and easements.

1.2. Objectives

SMUD employs the TVMP to maintain reliability of the overhead transmission facilities. SMUD's TVMP maintains transmission line reliability by preventing outages caused by vegetation located in and adjacent to transmission line rights-of-way. The program does this by establishing work practices and approved procedures for controlling specified clearances between transmission lines and vegetation.

1.3. Strategy

The Routine VM program strategy is to perform an annual patrol and complete identified tree work of 100% of the overhead transmission facilities to maintain radial clearance between vegetation and conductors/structures and to identify hazard trees which may strike the conductors or encroach within the Minimum Vegetation Clearance Distance (MVCD). This approach allows for ongoing monitoring of vegetation conditions to prevent an encroachment into the MVCD (see Table 2.) and to prevent reasonably foreseeable outages and/or possible fire ignitions.

1.4. Approach

The Right-of Way (ROW) Maintenance Program approach is to clear the ROW of incompatible species and to maintain low-growing diverse plant communities that are compatible with electrical facilities by using Integrated Vegetation Management (IVM) methods. This is a long-term approach which supports system reliability through reclaiming the ROW and managing for future workload. This approach allows for ongoing Transmission right-of-way (T-ROW) monitoring of vegetation corridors to prevent encroachment into the MVCD.

1.5. Work Methods and Practice

1.5.1. General

Vegetation Management manages all vegetation to obtain proper clearances as specified in Section 1.5, Clearances, of this standard.

Federal and State Occupational Safety and Health Administration (OSHA) requirements that apply to vegetation management activities shall be followed at all times. Refer to American National Standards Institute (ANSI) Z133.1-1994; Federal OSHA 1910.269; General Order (G.O.) 95, Rule 35; and the following Title 8 sections: Article 36, Sections 2940-2945 and Article 38, Sections 2950-2951.

Tree workers, equipment operators, and ground men shall use personal protective equipment such as hard hats, safety glasses, ear plugs, and chainsaw leg protectors. Activities shall be conducted in a manner that protects crew and public safety. Crews shall have radio or telephone communication on the job at all times. Contractors or sub-contractors are also required to follow the above rules.

1.5.2. Wire Zone and Border Zone Procedures

Vegetation Management shall manage transmission line corridors using the Wire Zone and Border Zone concept. This concept results in diverse habitat types. The wire zones consist of low growing shrub-forb-grass plant community (Early Succession Species). The Border Zone consists of taller shrubs, and brush plant community (transition zone). The concept creates a plant community that is resistant to tree invasion. Vegetation Management can manage the right-of-way for specific plants and varying goals –e.g. Habitat for Threatened, Endangered and Sensitive species such as Valley Elderberry Longhorn Beetle or Lotus Blue Butterfly can be created and maintained.

1.5.3. Procedures in Forest Areas

In designated fire prevention areas, Vegetation Management shall perform maintenance in accordance with the most recent edition of the “Power Line Fire Prevention Field Guide”, published jointly by the California Department of Forestry, the US Forest Service, and the US Bureau of Land Management. This incorporates the requirements of the California Resources Code, Section 4292 and Section 4293 regarding maintenance of clearance zones for transmission facilities.

1.6. Inspections

1.6.1. General

Vegetation Management shall inspect all SMUD transmission line segments once per calendar year. Based on inspections, Vegetation Management may schedule additional inspections where vegetation or hazardous trees may pose an interim threat.

Vegetation Management shall inspect all trees in and adjacent to the right-of-way for the potential of being a hazard tree and capable of contacting SMUD’s transmission facilities.

1.6.2. Inspection Areas

Vegetation Management shall group SMUD transmission facilities into two patrol/inspection areas based on climate, type of vegetation, and anticipated vegetation growth. Vegetation Management shall group into the Valley Area the areas in lower elevations with faster growing vegetation in mostly urban settings such as Sacramento and Placer Counties. Vegetation Management shall consider El Dorado County as a separate patrol/inspection area based on the higher elevations, slower growing vegetation, and more rural settings.

1.6.3. Ground Patrols

In all of the three counties, Sacramento County, El Dorado County, and Placer County, where SMUD has transmission lines, a Transmission Vegetation Patrol Person, a SMUD employee, shall perform a ground patrol once every calendar year. Transmission Vegetation Patrol Person shall inspect each span of wire and tree within or adjacent to the transmission line corridor. They shall list all vegetation that potentially can come into contact with transmission facilities for removal, pruning, or mitigation.

1.6.4. Aerial Patrols

In El Dorado County, Vegetation Management shall, at a minimum, annually patrol each transmission segment aerially for vegetation issues that could threaten SMUD facilities.

1.6.5. Hazard Trees

The Transmission Vegetation Patrol Person shall take special care to identify hazard trees that have died or that have suffered damage and could fall into the transmission right-of-way. This includes trees outside of the actual transmission right-of-way as well as trees in the right-of-way.

1.6.6. Inspection Data

Information recorded at each property for locations requiring maintenance includes the number of trees, tree species, prescription for vegetation management, and customer/location and special instructions such as access issues.

1.7. Clearances

1.7.1. Rights-of-way Management

SMUD manages transmission rights-of-way using the wire zone/border zone concept. With this strategy, SMUD’s Vegetation Management team does not intend to permit trees capable of growing taller than 15 feet to populate the rights-of-way. However, it must be recognized that certain situations promulgate the need to allow tall growing species within the wire zone/border zone. Exceptions include:

- Riparian Zones that agencies with jurisdictional authority require that tall growing species be retained.

- Areas of significant elevation change, placement of towers may span topography, negating the need to remove and/or trim tall growing trees. Such topographical influence would allow for trees at their mature height will exceed Clearance 1 distances.

- Heritage trees or trees of particular cultural and/or historic significance.

For the above mentioned exceptions to the wire zone/border zone, any vegetation requiring maintenance shall be performed according to the Table 1 chart below.

1.7.2. Clearance Types

As defined by NERC Standard FAC-003-3, a Transmission Owner shall determine and document the Minimum Vegetation Clearance Distances to be maintained for separation between a transmission conductor and vegetation.

Table 1: Guidelines for determining clearance distances to maintain separation between vegetation and transmission conductors at all times to meet California Public Resource Code 4293 requirements.

Transmission Line Voltage	Clearance
Less than or equal to 72 kV	4 Feet
Greater than 72 kV less than or equal to 110 kV	6 Feet
Greater than 110 kV	10 Feet

Table 2: Conductor and Structure Clearance Requirements are the minimum in this standard that must always be met (or exceed) in order to maintained to meet the NERC Minimum Vegetation Clearance Distances (MVCD) requirements, as described in this table.

Elevation (feet)	230 kV
Sea Level to 500'	3.03ft
500 – 1000'	3.09ft
1001 – 2000'	3.22ft
2001 – 3000'	3.36ft
3001 – 4000'	3.49ft
4001 – 5000'	3.63ft
5001 – 6000'	3.78ft

1.7.3. In Cycle Pruning

Vegetation work crews shall obtain through pruning or other means described in this standard the clearances in Table 3 for conductors and structures.

Table 3: Vegetation work crews shall obtain through pruning or other means described in this standard, the minimum amount of the clearances in Table for conductors and structures.

Growth Rate Per Year	Species	3 Year Cycle	5 Year Cycle
Fast (> 6 feet)	Cottonwood, Eucalyptus, Mulberry	At least 28 feet	At least 40 feet
Moderate (2 to 6 feet)	Ash, Coastal Redwood, Elm spp, Hackberry, Locust, Oak spp, Sycamore	16-20 feet	20-40 feet
Slow (< 2 feet)	Camphor, Cedar, Pine	Up to 16 feet	Up to 20 feet
spp—multiple specie			

Table 3, Clearance at the Time of Pruning Based on Growth Rate by Species

For work cycle locations, see Sections 2.1.1. Sacramento and 2.1.2. El Dorado.

1.7.4. Out of Cycle Pruning

On specific trees such as Heritage trees, Vegetation Management crews may not be able to obtain clearances listed in Table 3. In these cases, Vegetation Management may shorten the cycle for that specific tree in accordance with the tree's growth rate to achieve the proper clearance.

1.8. Training

The following personnel shall receive annual TVMP training:

- Vegetation Management Program Manager
- Vegetation Management Supervisors
- Transmission Work Planners
- Transmission Patrolmen

2. Annual Plan

SMUD uses the enterprise work management system SAP. Vegetation Management shall use SAP to track and manage right-of-way corridors for vegetation management. SAP enables Vegetation Management to list all vegetation management work in transmission rights-of-way by location. SAP assists in documentation, scheduling, and work management. SAP also assists in communication with customers that may be affected by vegetation work.

2.1. Schedule and Cycles

Vegetation Management shall review transmission line segment priorities to determine schedules based on maintaining clearances, fire hazard, and customer requirements. Vegetation Management will determine annual schedules and communicate the schedules to internal organizations.

2.1.1. Sacramento & Placer Counties – Three Year Cycle

Vegetation Management shall have a three year work cycle in Sacramento and Placer counties. These counties contain faster growing vegetation with transmission lines that pass through residential zones.

2.1.2. El Dorado County – Five Year Cycle

Vegetation Management shall have a five year work cycle in El Dorado County. The majority of rights-of-way in El Dorado County run through rural and mountainous terrain. Mountainous areas have a shorter growing season and typically slower growing species than those planted in valley locations. Therefore, in El Dorado County, a longer, 5-year cycle can be used to manage SMUD rights-of-ways.

2.1.3. Transmission Line Access

Vegetation Management crews may not have access to all transmission line rights-of-ways at all times. When a property owner restricts access to transmission line rights-of-ways, Vegetation Management shall attempt to coordinate and schedule vegetation management activities with the owner. If the property owner refuses to cooperate with SMUD's crews, SMUD shall take any and all legal actions necessary to gain access to the transmission line right-of-way. SMUD shall not tolerate any access restrictions to maintaining proper transmission line clearances.

2.2. Work Performance

2.2.1. Work Crew Management and Costs

Vegetation Management uses SAP enterprise software to create blanket orders to charge work for SMUD and contractor crews.

2.2.2. Work Crews

Contractor crews will perform actual pruning, removal, mowing and spraying services.

2.2.3. Quality Control

SMUD inspectors shall make a Quality Control inspection of all vegetation management field work.

2.2.4. Work Log

Crew foreman shall keep a daily log. The foreman shall deliver the daily log to Vegetation Management Supervision. The log shall report any discrepancies and corrections to the line segment vegetation list. The daily log shall include notations regarding trees not managed to specifications.

3. Outage Reporting

3.1. Quarterly Reporting

On a quarterly basis, T&D Maintenance shall request from the Vegetation Management workgroup and Power System Operations workgroup any vegetation caused outages during the quarter. T&D Maintenance shall send a report in the WECC format to the Reliability Compliance and Coordination (RC&C) workgroup. RC&C shall quarterly report to WECC.

3.2. Multiple Outages

Multiple sustained outages on a line caused by the same vegetation during a 24 hour period shall be reported as a single outage.

3.3. Reportable Outages

SMUD shall report vegetation caused outages on transmission lines operated at 230 kV or greater or transmission lines operated at lower voltages that have been designated by WECC as critical to the regional electric system reliability.

Vegetation outages caused by natural disasters such as earthquakes, fires, major storms, etc. or human activities such as logging, vehicle contact etc. shall not be reportable.

3.4. Reporting Outages

3.4.1. Vegetation Management

When a transmission line inspector or transmission patrolman determines that an outage on a 230 kV transmission line has been caused by vegetation, they shall report to the Power System Operator. They shall also report the following to the T&D Maintenance workgroup:

- Name of the transmission circuit
- Date and time of the outage
- Category of the outage

3.4.2. T&D Maintenance

T&D Maintenance shall report all Category 1 and Category 2 outages in a WECC format to the RC&C workgroup in time enough for them to report to WECC within 48 hours of the determination of an outage being caused by vegetation.

3.4.3. Outage Report Contents

The outage report for WECC shall include the following:

- Name of the transmission circuit
- Date and time of the outage
- Duration of the outage
- Description of the outage

- Pertinent comments
- Any counter measures taken
- Category of the outage

3.5. Outage Categories

When reporting on vegetation caused outages, Vegetation Management shall report outages as one of the following categories.

3.5.1. Category 1B - Grow-ins: Sustained Outages caused by vegetation growing into applicable lines, but are not identified as an element of an Interconnection Reliability Operating Limit (IROL) or Major Western Electricity Coordinating Council (WECC) Transfer Path, by vegetation inside and/or outside of the ROW.

3.5.2. Category 2B - Fall-ins: Sustained Outages caused by vegetation falling into applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, from within the ROW**.**

3.5.3. Category 3 - Fall-ins: Sustained Outages caused by vegetation falling into applicable lines from outside the ROW**.**

3.5.4. Category 4B - Blowing together: Sustained Outages caused by vegetation and applicable lines, but are not identified as an element of an IROL or Major WECC Transfer Path, blowing together from within the ROW.

4. Imminent Threat Emergency Procedures

For compliance with FAC-003-3, SMUD's Imminent Threat Procedure provides guidance for the notification and mitigation of any vegetation condition which is likely to cause a fault at any moment. This includes vegetation which under observed conditions encroaches within the MVCD distances (Table 2), or poses an imminent threat to the reliability of the transmission facilities. This procedure applies to all SMUD VM employees and VM contractors.

4.1. SMUD Emergency Procedures

All emergencies are directed to Distribution System Operations (DSO), extension (916) 732-5334. In the event that trees or other vegetation pose an imminent threat to SMUD facilities, DSO will be notified. DSO shall notify Vegetation Management to correct any vegetation hazards/threats to SMUD facilities. Outside normal work hours, DSO shall call Vegetation Management's on-call supervisor in accordance with Grid Asset's procedures.

4.2. Remedial Action

In the event that the Vegetation Management supervisor finds an imminent threat to a transmission line, the supervisor shall inform Power System Operations (PSO), extension (916) 732-5964. This allows the power system operator to take necessary remedial actions such as de-rating the line or taking the line out of service.

4.3. Corrective Action

Vegetation Management will take corrective action to eliminate imminent threats to transmission lines as soon as practicable.

5. Regulatory Clearance Requirements

5.1. California Public Utilities Commission (CPUC)

California Public Utilities Commission, G.O. 95, Rule 35 has two clearance requirements. One clearance requirement addresses the minimum clearance between supply conductors and vegetation. A second requirement addresses the clearance at the time of trimming.

G.O. 95, Rule 35 Minimum Clearance: The CPUC sets the minimum radial clearance between line conductors and vegetation in Table 1, Case 13 of G.O. 95. Table 1, Case 13 for supply conductors between 22.5 kV and 300 kV to have a clearance requirement of ¼ of pin spacing shown in Table 2, Case 15. A note in Table 1, Case 13 requires a minimum clearance of 18 inches for 22.5 kV to 105 kV. Table 3, below, shows the clearance requirements for G.O. 95's Table 1 Case 13 requirements. See Table 2 of this document for distance required by G.O. 95's Table 2, Case 15.

Conductor voltage, kV	69 kV	115 kV	230 kV
Pin spacing from table, inches	48"	60"	90"
Adjustments, 0.4 inches per kV over 75 kV for 115 kV, or 0.4 kV inches per kV over 150 kV for 230 kV	na	16"	32"
Required pin spacing including adjustments	48"	76"	122"
¼ of pin spacing (radial clearance requirement between conductor and vegetation)	12"*	19"	30.5"
* 18 inches minimum required			

Table 4 G.O. 95 Rule 35 Clearance Requirements—Table 1, Case 13

Clearance at Time of Trimming: Excerpt from text of G.O. 95, Rule 35, Appendix E

The radial clearances shown below are the minimum clearances that should be established, at time of trimming, between the vegetation and the energized conductors and associated live parts where practicable. Vegetation management practices may make it advantageous to obtain greater clearances than those listed below:

Operating Voltage	Minimum Clearance
Radial clearance for any conductor of a line operating at 2,400 or more volts, but less than 72,000	4 feet
Radial clearance for any conductor of a line operating at 72,000 or more volts, but less than 110,000	6 feet
Radial clearance for any conductor of a line operating at 110,000 or more volts, but less than 300,000	10 feet

Table 5 G.O. 95 Minimum Clearance Requirements

5.2. California Resource Code (CRC), Excerpts

Section 4292: "any person that owns, controls, operates, or maintains any electrical transmission …shall …maintain …a firebreak which consists of a clearing of not less than 10 feet in each direction from the outer circumference of such pole or tower"

Section 4293: "maintain a clearance of the respective distance which are specified in this section in all directions between all vegetation and all conductors which are carrying electric current:

(a) For any line which is operating at 2,400 or more volts, four feet.
(b) For any line which is operating at 72,000 or more volts, but less than 110,000 volts, six feet.
(c) For any line which is operating at 110,000 or more volts, 10 feet."

5.3. North American Reliability Corporation (NERC)

NERC Standard FAC-003-03 requires that a Transmission Owner determine and document the Minimum Vegetation Clearance Distances to be maintained for separation between a transmission conductor and vegetation. Table 2 presents tables and guidelines for determining clearance distances to maintain separation between vegetation and transmission conductors at all times. For compliance with FAC-003-3, SMUD's Imminent Threat Procedure provides guidance for the notification and mitigation of any vegetation condition which is likely to cause a fault at any moment. This includes vegetation which under observed conditions encroaches within the MVCD distances (Table 2)

5.4. SMUD Vegetation Management Clearances

SMUD's Vegetation Management uses clearance from the *Power Line Fire Prevention Field Guide* (CRC, Section 4293, Table 1). These clearances meet or exceed both *G.O. 95* requirements (Table 4) and the NERC Minimum Vegetation Clearance Distances (MVCD) requirements (Table 2).

Appendix C
Sensitive Plant Occurrence Discovery Record for the Upper American River Project Vegetation and Invasive Weed Management Plan

SENSITIVE PLANT OCCURRENCE DISCOVERY RECORD

_FESA-Listed CESA-Listed USFS Sensitive USFS Watch List

SCIENTIFIC NAME: OCCURRENCE ID:

SURVEYOR(S) INITIALS: JOB TITLE: DATE:

Location

COUNTY: OWNERSHIP:USGS QUAD:

SMUD FACILITY:

UTM (NAD83, Zone 10):

LOCATION/DIRECTIONS:

Occurrence

IS THIS A NEW OCCURRENCE, EXTENSION, or REVISIT?

INITIAL ID/MONITORING HISTORY/CNDDB OCCURRENCE:

AREA (ACRES OR METERS): DENSITY (#):

DESCRIPTION (PHENOLOGY, NUMBER OF PLANTS, AGE CLASS, DISPERSION, CHANGES IN OCCURRENCE, ETC.):

Habitat

ELEVATION (FT): ASPECT: %SLOPE:

LIGHT: MOISTURE: HUMUS/DUFF:

SOIL TYPE/TEXTURE (FIELD OR MAP DETERMINATION?):

TOPOGRAPHY:

REMARKS (MICROHABITAT, TIMBER TYPE, PLANT ASSOCIATES, ETC.):

DISTURBANCE/LAND USE/CHANGES IN SITE: (eg. OHV disturbance, timber harvest, invasive species, fire, etc):

PHOTO IDs (Habitat, Site features, Disturbance):

ADDITIONAL FIELD WORK NEEDED?

Appendix D
Invasive Weed Monitoring Form for the Upper American River Project Vegetation and Invasive Weed Management Plan

INVASIVE WEED MONITORING FORM

DATE:______________________ SURVEYOR(S): ____

SCIENTIFIC NAME:______________________________INFESTATION ID:_________________________

MANAGEMENT PRIORITY: HIGH ☐ MODERATE ☐ LOW ☐

SMUD FACILITY/DIRECTIONS TO INFESTATION:____

____

____

LAND OWNERSHIP:____________________________________ELEVATION:________________

UTM (NAD83, Zone 10):___________________

SITE DESCRIPTION/HABITAT: ____

____

____

APPROXIMATE SIZE OF INFESTATION: ___________________

COVER (%):_______________________ESTIMATED NUMBER OF INDIVIDUALS:____________

DISTRIBUTION: EVEN ☐ CLUMPED ☐ LINEAR ☐ PATCHY ☐ SINGLE PLANT ☐

PHENOLOGY: ROSETTE ☐ BOLT ☐ BUD ☐ FLOWER ☐ FRUIT ☐ SENESCENT ☐

*HORIZONTAL DIST. TO WATER:_________(FT.) *VERTICAL DIST. TO WATER:_________(FT)
*ONLY NEEDED IF INFESTATION IS WITHIN 500 FT. OF WATER

PHOTO ID'S (SITE LOCATION, HABITAT):

____

____

RECOMMENDED MANAGEMENT: ERADICATE ☐ CONTROL ☐ PREVENTION ☐

TREATMENTS: HAND PULL ☐ DIG UP ☐ CLIP FLOWER HEADS ☐
MECHANICAL REMOVAL ☐

NOTES:

____

____

Appendix E
Water Quality Monitoring Plan for the Upper American River Project Vegetation and Invasive Weed Management Plan

1.0 INTRODUCTION

The following WQMP is adapted from the PG&E, Mokelumne River Hydroelectric Project (FERC Project 137), Integrated Pest Management Plan approved in February 2016.

The aquatic and riparian buffers described in Section 5 of the VIWMP are based on site-specific human health and environmental risk assessments prepared for this project. Similar buffer widths have been used effectively for several hydroelectric projects throughout Region 5 including the El Dorado Irrigation District's El Dorado Hydroelectric Project (FERC No. 184), Integrated Pest Management Plan and PG&E's Mokelumne River Hydroelectric Project on the Eldorado National Forest and PG&E's Crane Valley Hydroelectric Project on the Sierra National Forest and PG&E's Rock Creek-Cresta Hydroelectric Project and Pit 3, 4, 5 Hydroelectric Project on the Plumas National Forest. Water Quality Monitoring has been conducted for all of these herbicide programs and in all but one instance there were no detected residues of herbicide in protected waters using similar stream buffers. The one instance where herbicide was detected was a result of human error during sampling collections.

Below is a summary of monitoring studies conducted in Region 5, which support the stream buffers identified in the VIWMP for glyphosate and triclopyr. These monitoring studies also support the idea of limiting the number of years of water quality sampling. The following paragraphs are based on the document entitled, "*A Review and Assessment of the Results of Water Monitoring for Herbicide Residues For the Years 1991 to 1999", USFS Region Five*, authored by David Bakke, Regional Pesticide-Use Specialist.

Region 5 Water Quality Monitoring Study: The study compiles and summarizes the results of fifteen separate water monitoring reports authored by hydrologists and geologists on the Angeles, Eldorado, Lassen, Sierra, and Stanislaus National Forests. These reports documented results from over 800 surface and ground water samples, as a result of reforestation and noxious weed eradication projects utilizing three herbicides (glyphosate, hexazinone, and triclopyr).

The report provides recommendations to reduce future water quality monitoring and sampling, primarily for ground-based applications of glyphosate and triclopyr on the westside of the Sierra Nevada. Subsequent studies and extensive monitoring data throughout Region 5 also suggest the established buffers are adequate and highlight there is no longer a need for extensive and expensive and automatic water quality sampling for other herbicides as well. The report concludes the following regarding stream buffers:

> **Triclopyr:** "It would appear from these monitoring data that untreated streamside buffers of greater than 15 feet in width reduce risk of water contamination to near zero, although it

should be noted that the 82 ppb transient level does not represent a substantial risk of harm to humans or the environment.

Glyphosate:"Based on monitoring to date, glyphosate applications, as generally practiced in reforestation projects, will not result in stream sediment or water contamination. With buffers as small as 10 feet, glyphosate was found to be non-detectable in collected samples."

1.1 WATER QUALITY MONITORING PLAN

The objectives of this monitoring plan are: 1) Per the Sierra Nevada Forest Plan Amendment – Riparian Conservation Objective #1 (SNFPA RCO #1) - Ensure that beneficial uses of the water body are adequately protected using the project stream buffers and BMPs; 2) Determine whether pesticides have been applied safely, restricted to intended target areas, and have not resulted in unexpected non-target effects; 3) Document and provide early warning of possible hazardous conditions resulting from possible contamination of water or other non-target areas by pesticides; and 4) Document the results of the water quality monitoring program (reporting and evaluation).

To satisfy these four objectives outlined above, SMUD shall be responsible for water quality monitoring to ensure that pesticides prescribed and applied under the Vegetation and Invasive Weed Management Plan do not enter surface waters. SMUD proposes to implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and BMPs. SMUD will collect water samples within the Project area at the times and locations specified below.

Samples will be collected, stored and transported using EPA-approved procedures, including sampling chain of custody. All water samples will be tested at a California-certified laboratory. The laboratory ELAP number will be appended to each document. The water analysis will be carried out to determine if the prescribed herbicides and their associated breakdown products are present at detectable concentration.

1.2 SAMPLE METHOD

SMUD proposes to implement a minimum of one year of water quality monitoring of perennial streams that are adjacent to treated areas to document the effectiveness of proposed buffers and BMPs. SMUD will discontinue water quality monitoring following one year of monitoring for each pesticide as long as there are no positive detections of pesticides used on the Project. Additional monitoring will occur if new herbicides or new application techniques are proposed by SMUD and authorized by the ENF for use. If circumstances arise that trigger the need for additional monitoring, SMUD, in consultation with the ENF, will discuss additional survey and sample strategies.

A representative number of water samples will be collected above and below treated areas before and after pesticide applications and within 60 days of an application. Water monitoring is not proposed for reservoirs, forebays, canals or seasonal/intermittent streams within the Project area. The number of water samples collected will depend upon the size of the treatment area (treatment area will vary from year to year) and location of perennial streams within the treatment area. Pre-application samples will be taken no earlier than 2 weeks prior to the pesticide application. Post application samples will be taken within 24 hours of the first rain of greater than ½ inch within 60 days of a pesticide application.

All water samples shall be taken in 1-liter amber glass bottles that have been solvent-rinsed. Samples will be taken at a maximum distance of 0.25 miles above and below the application area and above any incoming tributary. All water samples will be taken in mid-channel (if possible depending upon flow and safety concerns) and as near to the mid-depth of the stream as possible. Sediment disturbance will be minimized and samples will be collected in flowing water (samples will not be taken in standing/stagnant water). The samples will be taken upstream from the sampler's body to ensure no contact with the skin or clothing. A field blank will be provided from each sampling day to ensure that contamination of the sample bottles does not occur while in transit to and from the sample site. The samples will be retained in coolers at 4° C until they are delivered to the laboratory. All samples will be delivered to the analytical laboratory within 24-36 hours of sampling. Chain of custody (COC) documentation will follow the samples through the analytical process and a copy of the signed COC will be provided with the analytical report. The laboratory detection limits and full QA/QC documentation will be provided by the laboratory as a part of the results package. If the detection limits are not met or the results do not meet QA/QC requirements, the samples will be rerun.

If the water quality monitoring results detect the presence of pesticides, SMUD and the ENF will review and determine if it is necessary to modify components of the IPM Strategy regarding pesticide applications. If pesticides are detected, then water quality monitoring will continue until it is determined that the pesticide detections are not biologically relevant.

1.3 MONITORING LOCATIONS

A series of sample locations are to be determined by SMUD and the ENF as a component of the development of this plan. Sample locations will include perennial streams both upstream and downstream from treatment sites within the Project area. A representative and reasonable number of sampling sites will be identified that reflects cost, practical realities and results of previous sampling efforts. If an herbicide has been sampled for at least once in the year it was used and has not been detected in water samples, then no further monitoring for that herbicide will occur in future years unless there is evidence of off-site movement of that herbicide.

SMUD will include a map with their PUP and PCR submittal that shows the locations of the proposed water quality sample points. Sample locations will be established in non-target areas that are considered to have a high potential or are most likely to accumulate herbicide(s) in the event of contamination. One sample will be taken above and below a representative number of treatment sites. Sample locations will be a representative sample of perennial stream courses and soil types and be taken adjacent to areas to capture the variety of herbicides used that year.

Prior to the application of herbicides, pre-treatment samples will be collected to provide background or baseline information for the treatment area. Three replicate surface water samples will be collected at each monitoring location (number of monitoring locations to be determined upon approval of this plan) one time before pesticide applications and one after the applications to evaluate and determine whether off-site movement of chemical residue is occurring or if pesticides are already present within the Project area that are part of some other management activity on the ENF or adjacent private property.

1.4 PROJECT EVALUATION AND REPORTING

SMUD will keep on file all water quality monitoring records. Records will include the following information and documents for all monitoring locations: 1) maps of all treatment areas and monitoring stations; 2) sample documentation forms -"chain of custody forms"; 3) correspondence with labs; 4) information by unit on the dominant soil type of the unit and the date of treatment and 5) when the samples were collected in relation to the pesticide treatment date(s). The project file will also include all records of correspondence with organizations, groups and individuals concerning results of the water monitoring and other water quality issues.

Results of sample analysis are generally received within three weeks of delivery of the sample to the lab. The results of water quality monitoring will be shared with the ENF as soon as possible after the results are obtained from a certified lab. The results shall be included in the annual report. SMUD and the ENF will evaluate the monitoring results in terms of compliance with and adequacy of project specifications and to determine if results exceed thresholds established by the State Water Resources Control Board. Adjustments to the implementation of this document and any additional monitoring beyond the first year shall be made in coordination with the ENF and SMUD. In consultation with the ENF, application methods and/or stream buffers may be adjusted.

.

In each year in which water quality monitoring is conducted, the ENF will be provided with a brief water quality monitoring report, which includes (as applicable) the 'per site' findings of all previous years monitoring results, and also the next year's treatment proposal (as applicable). The annual summary report will include site specific information including coordinates/ maps of all sampling locations, information about conditions during field collection (e.g, when samples were first collected), EPA Standard Methods used for analysis, and laboratory results.

LITERATURE CITED

Bakke, D. 2001. A review and assessment of the results of the water monitoring for pesticide residues from the years 1991 to 1999. USFS Region 5.

USDA Forest Service. 2011. Region 5 Forest Service Handbook 2509.22, Soil and Water Conservation Handbook, Chapter 10, Water Quality Management Handbook. USDA Forest Service, Southwest Region, Vallejo, CA.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest Service Lands. Volume 1 National Core BMP Technical Guide. F2-990a.

Appendix F
Biological Evaluation/Biological Assessment For Terrestrial and Aquatic Wildlife

BIOLOGICAL EVALUATION/BIOLOGICAL ASSESSMENT FOR TERRESTRIAL AND AQUATIC WILDLIFE

SMUD VEGETATION AND INVASIVE WEED MANAGEMENT PLAN FOR THE UPPER AMERICAN RIVER PROJECT (UARP) FERC 2101,
ELDORADO NATIONAL FOREST, PACIFIC RANGER DISTRICT

PROJECT LOCATION:
El Dorado County, California
T11N R11E 24-26
T11N R12E Sections 1, 10-16, 19–22, 28 & 29
T11N R13E Sections 1-8
T11N R14E Sections 1, 2, 6, 7, 12, 18
T11N R15E Sections 5–8
T12N R13E Sections 32–36
T12N R14E Sections 2–4, 8–11, 14–33, 35, 36
T13N R14E Sections 13–15, 22, 23, 26, 27, 34, 35
T13N R15E Sections 2–5, 7–9, 17, 18
T13N R16E Sections 6–9, 16, 17
T14N R15E Sections 33, 34
Mount Diablo Baseline and Meridian (MDB&M).

DATE: 9 October 2017 **REPORTER:** Holly Burger, Wildlife Biologist

Prepared By: Holly Burger, contractor for SMUD Title: Wildlife Biologist Date: 10/9/2017

Reviewed By: Nancy Nordensten Title: NEPA Coordinator, ENF Date: December, 2017

Approved By: ______________________Title___________________ Date: ___________

SMUD Contact: *Ethan Koenigs* Phone Number: *530-647-5094* Email: *ethan.koenigs@smud.org*

EFFECTS DETERMINATIONS

SMUD's Vegetation and Invasive Weed Management Plan (VIWMP) for the Upper American River Project (UARP) is not likely to result in a trend towards Federal listing or loss of viability of any of the sensitive terrestrial and aquatic wildlife species identified for the Project Area (Table 1).

Table 1. Effects determinations for threatened, endangered, or sensitive terrestrial and aquatic wildlife species that may occur in the Project Area.

Species	Scientific Name	Status (Federal/State)	Determination
Federally Listed Species			
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT/–	No effect
Sierra Nevada yellow-legged frog	*Rana sierrae*	FE, FSS/ST	No effect
Forest Service Sensitive Species			
Western bumble bee	*Bombus occidentalis*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing
Hardhead	*Mylopharadon conocephalus*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Foothill yellow-legged frog	*Rana boylii*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Western pond turtle	*Actinemys marmorata*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Bald eagle	*Haliaeetus leucocephalus*	FD, FSS/SE, SFP	May affect individuals, but is not likely to result in a trend toward federal listing
Northern goshawk	*Accipter gentilis*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
California spotted owl	*Strix occidentalis occidentalis*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Willow flycatcher	*Empidonax traillii*	FSS/SE	No effect
Townsend's big-eared bat	*Corynorhinus townsendii*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Pallid bat	*Antrozous pallidus*	FSS/SSC	May affect individuals, but is not likely to result in a trend toward federal listing
Fringed myotis	*Myotis thysanodes*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing
Sierra Nevada red fox	*Vulpes vulpes necator*	FSS/ST	No effect
Pacific marten	*Martes caurina*	FSS/–	May affect individuals, but is not likely to result in a trend toward federal listing

FE = Federally Endangered; FD = Federally Delisted; FSS = Forest Service Sensitive; SE = State Endangered; ST = State Threatened; SCT = State Candidate Threatened; SSC = State Species of Special Concern

1 INTRODUCTION

1.1 Purpose

This Biological Evaluation/Biological Assessment (BE/BA) has been developed to review the VIWMP (Project) in sufficient detail to determine potential direct and indirect effects on Threatened, Endangered, or Sensitive (TES) terrestrial and aquatic wildlife species. TES species are defined as U.S Fish and Wildlife Service (USFWS) threatened, endangered, or proposed species, and those designated as “Forest Service Sensitive” (FSS) by the Pacific Southwest Region (Region 5) of the USFS. A separate document addresses sensitive plant species.

1.2 Location

The Project Area addressed by this BE/BA is defined as the UARP FERC boundary limited to USFS lands (Figure 1).

2 CURRENT MANAGEMENT DIRECTION

The overall management of sensitive wildlife species in the Eldorado National Forest (ENF) is dictated by the ENF Land and Resource Management Plan (1989) as amended in 2004 by the Sierra Nevada Forest Plan Amendment (USFS 2004). Management directives are guided by broad goals and strategies, species-specific land allocations and desired conditions, and various applicable standards and guidelines. Additional management direction for sensitive wildlife species is established by the License (FERC 2014) as well as SMUD’s proposed general conservation measures that were adopted under the UARP Biological Opinion (USFWS 2009). In general, the ENF is responsible for the implementing administrative measures to protect and improve the viability of endangered, threatened, rare, and sensitive wildlife species that may occur in the forest.

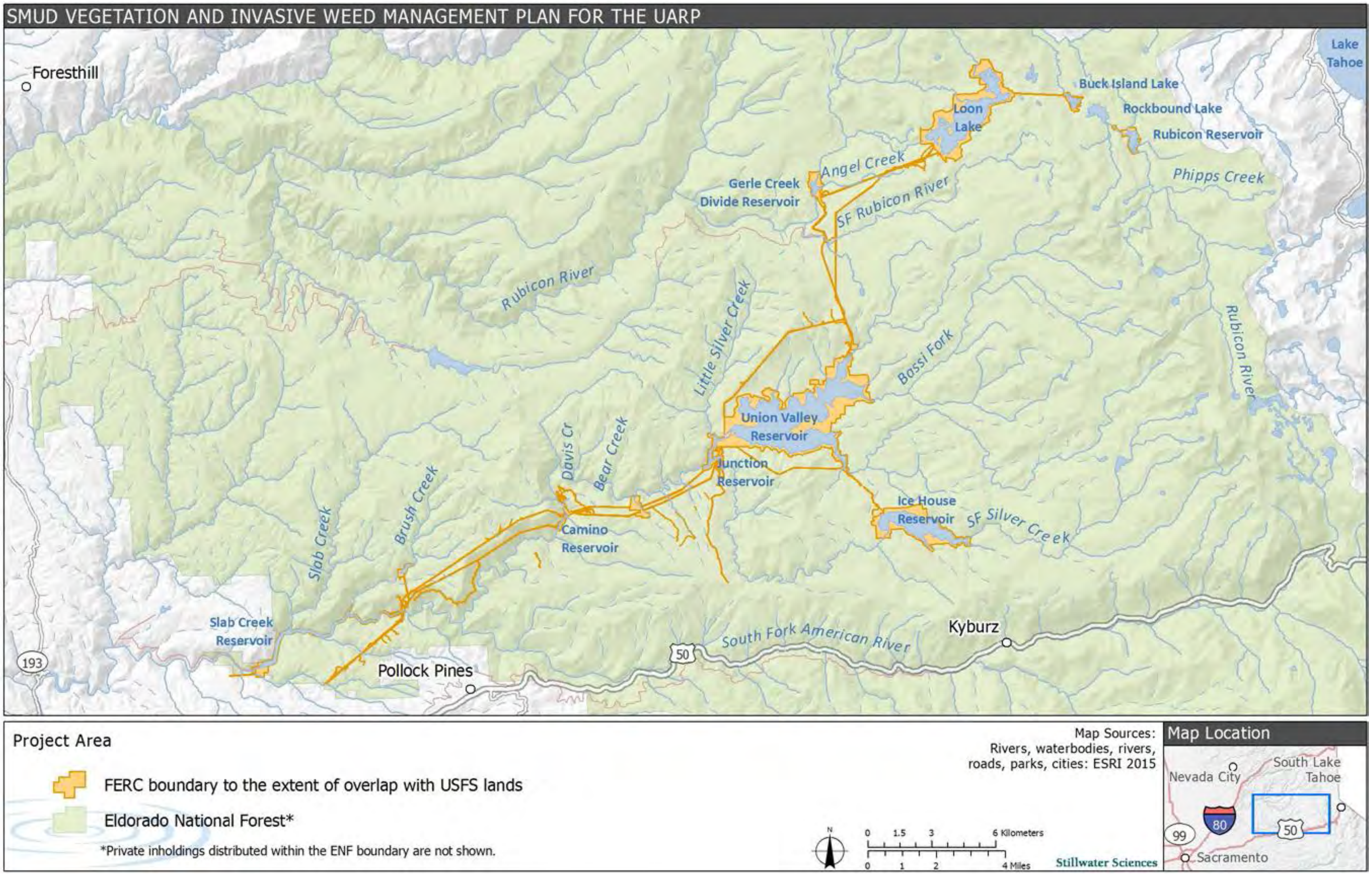


Figure 1. Project Area for the Terrestrial and Aquatic Wildlife Biological Evaluation/Biological Assessment for SMUD's Vegetation and Invasive Weed Management Plan for the UARP.

2.1 Sierra Nevada Forest Plan Amendment

The 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (USFS 2004) lays out broad management goals and strategies for addressing five problem areas: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems and associated species; fire and fuels management; noxious weeds; and lower west-side hardwood ecosystems. The two problem areas that are applicable to the Project Area include: (1) aquatic, riparian, and meadow ecosystems, and (2) lower west-side hardwood ecosystems.

2.1.1 Aquatic, Riparian, and Meadow Ecosystems

The Sierra Nevada Forest Plan Amendment was intended to provide regionally consistent direction to protect and restore desired conditions of aquatic, riparian, and meadow ecosystems in Sierra Nevada national forests and provide for the viability of species associated with those ecosystems.

The strategy for aquatic management describes broad goals which outline a comprehensive framework for establishing desired conditions at larger scales. These goals include maintaining and restoring the following:

- Water quality
- Species viability
- Plant and animal community diversity
- Special habitats
- Watershed connectivity
- Floodplains and water tables
- Watershed condition
- Streamflow patterns and sediment regimes
- Stream banks and shorelines

2.1.2 Lower West Side Hardwood Ecosystems

Goals for lower west side hardwood forest ecosystems under the Sierra Nevada Forest Plan Amendment (USFS 2004) include establishing and maintaining:

- a diversity of structural and seral conditions in landscapes in proportions that are ecologically sustainable at the watershed scale;
- sufficient regeneration and recruitment of young hardwood trees over time to replace mortality of older trees; and
- sufficient quality and quantity of hardwood ecosystems to provide important habitat elements for wildlife and native plant species.

2.1.3 USFS Species-Specific Land Allocations, Desired Conditions, and Standards and Guidelines

The Sierra Nevada Forest Plan Amendment (USFS 2004) relies on a network of land allocations and has an associated set of desired conditions, management intents, and management objectives. These three elements provide direction to land managers for designing and developing fuels and vegetation management projects. Species-specific land allocations, desired conditions, and standards and guidelines are included in the Sierra Nevada Forest Plan Amendment for northern goshawk, California spotted owl, and Pacific fisher.

2.1.3.1 Northern Goshawk

Land Allocations

The USFS is directed to establish and maintain 200-acre Protected Activity Centers (PACs) around all known and newly discovered breeding territories of northern goshawks on national forest lands within the Sierra Nevada (USFS 2004). PACs are intended to contain the best available nesting habitat in the largest contiguous blocks possible, based on aerial imagery. In patchy habitats, PACs are to consist of multiple patches greater than 30 acres within 0.5 miles of the nest site. Best available forest stands for PACs on the west side of the Sierra Nevada have the following characteristics: (1) trees in the dominant and co-dominant crown classes average 24 inches diameter at breast height (dbh) or greater, and (2) stands have at least 70 percent tree canopy cover. Non-forest vegetation types (e.g., brush and meadows) are not counted as part of the 200 acres.

As additional nest location and habitat data become available, the USFS is directed to adjust PAC boundaries as necessary to better include the best available 200 acres. PACs are to be maintained regardless of occupancy status, unless the habitat is rendered unsuitable by a catastrophic stand-replacing event (e.g., fire) and there are no opportunities to remap the PAC in proximity to the affected PAC (USFS 2004).

Desired Conditions

The desired conditions for stands in each PAC include: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Standards and Guidelines

- Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately 0.25 miles of the nest site during the breeding season (15 February through 15 September) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a PAC is unknown, either apply the LOP to a 0.25 mile area surrounding the PAC, or survey to determine the nest stand location.
- The LOP may be waived for vegetation treatments of limited scope and duration, when a BE determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a BE concludes that a nest site will be shielded from planned activities by topographic features that will minimize disturbance, the LOP buffer distance may be modified.
- Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the acres in northern goshawk PACs in the 11 Sierra Nevada national forests.
- Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle (OHV) route, trail, and road uses (including road maintenance). Evaluate proposals for new roads, trails, OHV routes, and recreational and other developments for their potential to disturb nest sites.

2.1.3.2 California Spotted Owl

Land Allocations
California spotted owl PACs have been delineated on national forest lands since 1986. Current management direction (USFS 2004) requires 300-acre PACs around all known and newly discovered territories of California spotted owls on Sierra Nevada forests. PACs are intended to contain the best available habitat in as compact a unit as possible. Best available habitat in general includes: (1) two or more canopy layers; (2) dominant and co-dominant trees in the canopy averaging at least 24 inches dbh; and 3) at least 70 percent total canopy cover. As additional nest location and habitat data become available, the USFS is directed to adjust PAC boundaries as necessary to better include the best available 300 acres. PACs are to be maintained regardless of occupancy status, unless the habitat is rendered unsuitable by a catastrophic stand-replacing event (e.g., fire) and there are no opportunities to remap the PAC within a 1.5 mile radius to the affected PAC (USFS 2004).

Desired Conditions
The desired conditions for stands in each PAC include: (1) at least two tree canopy layers; (2) dominant and co-dominant trees with average diameters of at least 24 inches dbh; (3) at least 60 to 70 percent canopy cover; (4) some very large snags (greater than 45 inches dbh); and (5) snag and down woody material levels that are higher than average.

Standards and Guidelines

- Maintain a LOP, prohibiting vegetation treatments within approximately 0.25 miles of the activity center during the breeding season (1 March through 15 August), unless surveys confirm that California spotted owls are not nesting (as per *Guidance on Limited Operating Periods for the California Spotted Owl*, dated 6 April 2015).
- Prior to implementing activities within or adjacent to a California spotted owl PAC where the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.
- The LOP may be waived for vegetation treatments of limited scope and duration, when a BE determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a BE concludes that a nest site will be shielded from planned activities by topographic features that will minimize disturbance, the LOP buffer distance may be modified.
- Conduct vegetation treatments in no more than 5 percent per year and 10 percent per decade of the acres in California spotted owl PACs in the 11 Sierra Nevada national forests. Monitor the number of PACs treated at a bioregional scale.
- Mitigate impacts where there is documented evidence of disturbance to the nest site from proposals for new roads, trails, OHV routes, and recreational and other developments for their potential to disturb nest sites.

2.1.3.3 Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

The ENF Land and Resource Management Plan (USFS 1989) as amended in 2004 by the Sierra Nevada Forest Plan Amendment (USFS 2004) does not provide specific guidelines for the management of FSS bats, including pallid bat, Townsend's big-eared bat, and fringed myotis. These species are associated with oak woodlands, snags, rock outcrops, caves, bridges, abandoned mines, and riparian habitat. General Forest-wide Standards and Guidelines are expected to provide habitat to support viable populations of these species. Restoration of hardwood ecosystems is accomplished through standards and guidelines requiring retention of large live hardwood trees and snags and recruitment of young hardwood trees. Meadow and riparian habitats are restored and sustained through Standards and Guidelines implemented within 150 to 300 foot buffers along perennial and seasonally flowing streams, springs, lakes, and meadows.

2.2 UARP License

The 2014 UARP License includes the USFS 4(e) Final Terms and Conditions of the Federal Powers Act (FERC 2014), the UARP Mitigation Monitoring Plan in the Final California Environmental Quality Act (CEQA) Supplemental Analysis to the FEIS (SMUD 2008), and the State Water Resources Control Board (SWRCB) Section 401 Water Quality Certification and CEQA Mitigation Monitoring and Reporting Plan (SWRCB 2013a, b). The License requires specific actions to protect sensitive terrestrial wildlife species. The specific wildlife and plant protection measures listed below generally apply to the entire UARP and are applicable to the Project:

- Before commencing any new construction or maintenance (including but not limited to proposed recreation developments) authorized by the license on National Forest System lands that may affect a USFS, USFWS, or CDFW sensitive plant or wildlife species or its habitat, the licensee shall ensure that a BE (including necessary surveys) is completed that evaluates the potential effects of the action on the species or its habitat. The BE must be approved by USFS. In consultation with FERC, USFS, USFWS, or CDFW may require mitigation measures for the protection of sensitive species.
- If occurrences of USFS, USFWS, or CDFW sensitive plant or wildlife species are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, the licensee shall immediately notify USFS, CDFG, and USFWS. If USFS, USFWS, or CDFG determine that the Project-related activities are adversely affecting the sensitive species, the licensee shall, in consultation with USFS, CDFW, and USFWS, develop and implement appropriate protection measures.
- The licensee shall, beginning the first full calendar year after license issuance, in consultation with USFS, USFWS, and CDFW annually review the current list of special status plant and wildlife species (species that are Federal Endangered or Threatened, USFS Sensitive, or ENF Watch Lists) that might occur on National Forest System lands in the Project Area directly affected by Project operations. When a species is added to one or more of the lists, USFS, USFWS, and CDFW, in consultation with the licensee shall determine if the species or un-surveyed suitable habitat for the species is likely to occur on such National Forest System lands. For such newly added species, if USFS, USFWS, or CDFW determine that the species is likely to occur on such National Forest System lands, the licensee shall develop and implement a study plan in consultation with USFS, USFWS, and CDFW to reasonably assess the effects of the Project on the species. The licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to USFS, USFWS, and CDFW for review and approval. The licensee shall file the report, including evidence of consultation, with FERC and shall implement those resource management measures required by FERC.

3 EXISTING ENVIRONMENT

The list of TES species with the potential to occur in the vicinity of the Project Area was developed by querying or reviewing the following sources:

- USFWS Information for Planning and Conservation (IPaC) portal, to determine federally endangered and threatened species and Critical Habitat in the Project vicinity (USFWS 2017a);
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2017);
- the most current (2013) Region 5 Regional Forester's Sensitive Animal Species List (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5435266.xlsx); and
- biological resource surveys that were conducted as part of SMUD's FERC relicensing process for the UARP and Pacific Gas and Electric Company's Chili Bar Project (DTA 2004a–f, DTA and Santa Cruz Predatory Bird Research Group 2004, DTA and Stillwater Sciences 2005a–c).

The USFWS and CNDDB database queries were each based on a search of the U.S. Geological Survey (USGS) 7.5-minute quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

Spatial data for known occurrences of TES wildlife species were compiled and plotted in a Geographic Information System (GIS) (Figure 2). Sources of spatial data included the CNDDB (CDFW 2017), 2016 SMUD UARP monitoring results for amphibians, aquatic reptiles, and bald eagles, and PAC information from USFS (2012).

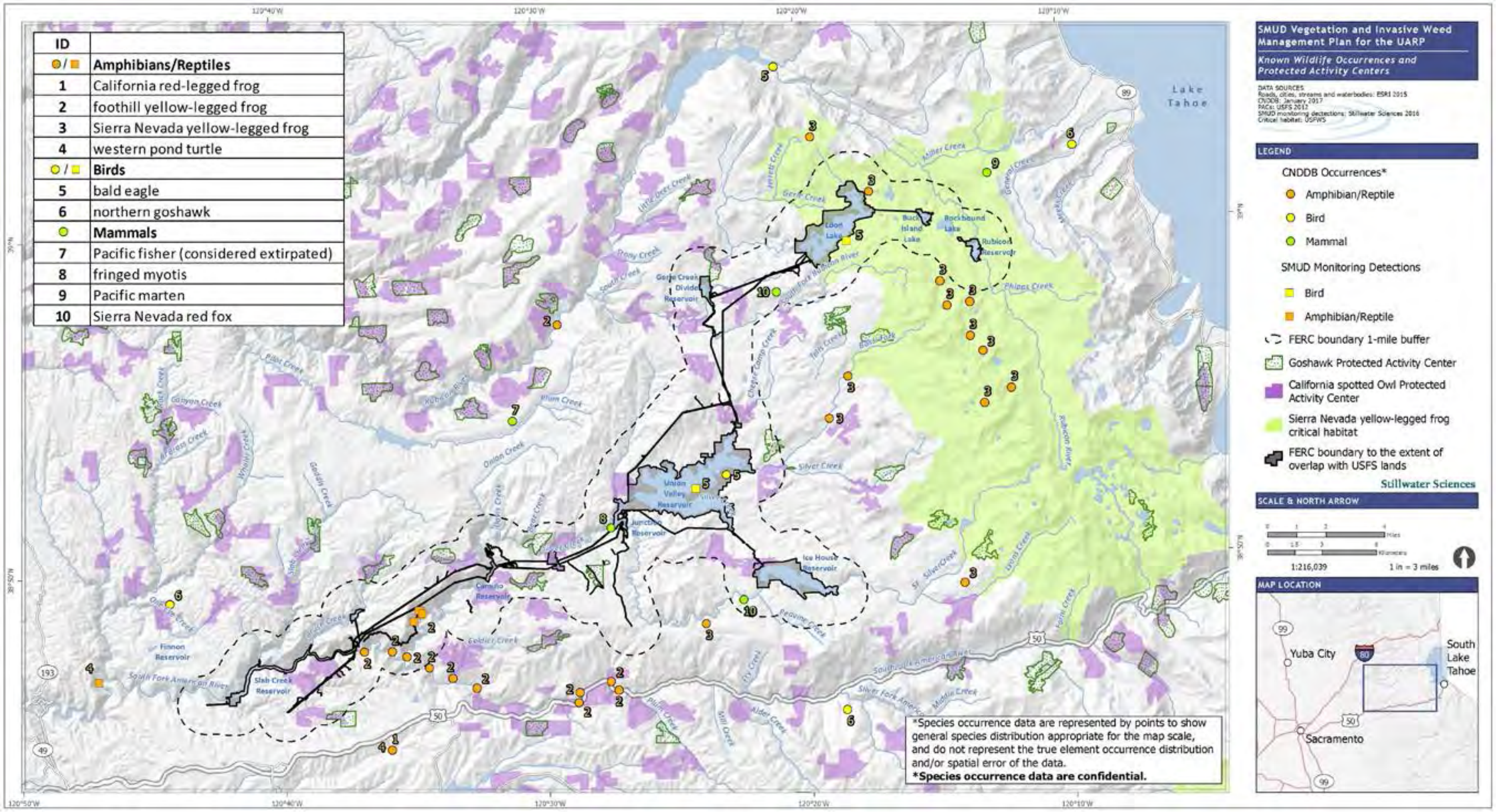


Figure 2. Known wildlife occurrences and Protected Activity Centers within a 1-mile buffer of the VIWMP Project Area. (SPECIES OCCURRENCE DATA ARE CONFIDENTIAL).

Although no species-specific wildlife surveys were conducted for this Project, a number of surveys conducted in the Project Area during relicensing of SMUD's UARP and/or Pacific Gas and Electric Company's Chili Bar Project were reviewed. These surveys included:

- valley elderberry longhorn beetle surveys conducted at UARP facilities below 3,000 ft elevation in 2002–2003 (DTA 2004a).
- reservoir and stream fish species composition and distribution surveys conducted in 2002–2004 (DTA and Stillwater Sciences 2005a, DTA and Stillwater Sciences 2005b);
- amphibian and aquatic reptile surveys conducted in 2002–2004 (DTA and Stillwater Sciences 2005c);
- bald eagle surveys conducted in 2002–2004 (DTA and Santa Cruz Predatory Bird Research Group 2004) and 2015–2016 (SMUD 2016);
- northern goshawk surveys conducted in 2002–2003 (DTA 2004b);
- California spotted owl surveys conducted in 2002–2003 (DTA 2004c);
- willow flycatcher nesting habitat surveys conducted in 2002 (DTA 2004d);
- bat trapping, roost surveys, and acoustic surveys conducted in 2002–2003 (DTA 2004e); and
- mesocarnivore habitat mapping conducted in 2002 (DTA 2004f).

Table 2 identifies the TES animal species that have potential to be present in the vicinity of the Project Area, and could therefore be affected by the Project. Of these species, only those with the potential to be affected by the Project are analyzed in detail. Appendix A (Animal Species Considered in the BE/BA) provides a list of all TES species that were considered to have the potential to occur[1] within the Eldorado National Forest or vicinity, including those that were eliminated from the need for detailed analysis based on rationale relating to habitat requirements and/or geographic range. If a species on the preliminary list requires habitat that is lacking from the Project Area or vicinity of the Project, or if the Project occurs outside the species' known range (including elevation range), the species was considered unlikely to occur and potential impacts to that species as a result of the proposed Project were not assessed.

Each of the species in Table 2 is discussed in detail below.

[1] A fisher was reported as observed crossing a road approximately 5 mi north of the Project Area in 1995 (CDFW 2017) (Figure 2). Zielinski et al. (1997) notes that misidentifying other species for fishers—especially marten—is common. The next closest documented sighting of a fisher, from 1972, is approximately 20 miles to the northeast, to the west of Lake Tahoe (CDFW 2017). An intensive survey effort during the early 1990s showed no verifiable evidence of fishers in the area extending from northeastern Shasta County south to Yosemite National Park, even though 66 track-plate surveys and 184 camera stations were deployed in this area (Zielinski et al. 1995, as cited in SMUD 2004). A scarcity of sightings in the northern Sierra Nevada over the last several decades suggests that fishers are likely extirpated from this area.

Table 2. Potential for Project-related effects on TES species that may occur in the vicinity of the Project Area.

Listed, proposed and/or sensitive species	Status[1] (Federal/ State)	Species habitat	Documented in the UARP?	Documented in the ENF?	Potential for effects[2]	
					Yes/No	No/Reason
Valley elderberry longhorn beetle	FT/–	Riparian and oak savanna habitats below 3,000 feet with host plant *Sambucus* sp. (blue elderberry)	Yes	No	No	This species occurs below 500 ft in elevation, which is outside of USFS lands
Western bumble bee	FSS/–	Uses flowering plants in meadows and forested openings; abandoned rodent burrows are used for nest and hibernation sites for queens	No	Yes	Yes	
Hardhead	FSS/SSC	Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity	Yes	Yes	Yes	
Sierra Nevada yellow-legged frog	FE, FSS/ST	Lakes, ponds, and streams in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats. **Proposed Critical Habitat:** Crystal Range Unit and Squaw Ridge Unit	No	Yes	No	No effect; species not present in the Project Area; Critical Habitat Primary Constituent Elements will not be impacted
Foothill yellow-legged frog	FSS/SSC	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate.	Yes	Yes	Yes	
Western pond turtle	FSS/SSC	Permanent and intermittent aquatic habitats including rivers, streams, lakes, and ponds, below 5,000 feet in elevation.	Yes	Yes	Yes	
Bald eagle	FD, FSS/SE, SFP	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests and winter communal roosts in advanced-successional conifer forest within 1.6 km (1 mi) of open water	Yes	Yes	Yes	
Northern goshawk	FSS/SSC	Forested habitats. Areas adjacent to known sightings or Goshawk Management Areas or Activity Centers.	Yes	Yes	Yes	
California spotted owl	FSS/SSC	Forested habitats. Areas adjacent to known sightings or Spotted Owl Habitat Areas,	Yes	Yes	Yes	

Listed, proposed and/or sensitive species	Status[1] (Federal/ State)	Species habitat	Documented in the UARP?	Documented in the ENF?	Potential for effects[2]	
					Yes/No	No/Reason
		Protected Activity Centers, or individual activity centers.				
Willow flycatcher	FSS/SE	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water.	No	Yes; only one willow flycatcher breeding territory located within the ENF	No	No effect; no willow flycatchers detected during relicensing surveys (DTA 2004d); only marginally suitable habitat within Project Area
Townsend's big-eared bat	FSS/SSC	Caves, mines or abandoned buildings and adjacent open, riparian and forest habitat to those features below 6,000 feet elevation.	No	Yes	Yes	
Pallid bat	FSS/SSC	Rock crevices, tree hollows (particularly hardwoods), mines, caves and abandoned buildings below 6,000 feet elevation (Philpott 1997, Barbour and Davis 1969).	No	Yes	Yes	
Fringed myotis	FSS/–	Crevices in rocks, cliffs, buildings, underground mines, caves, bridges, and in large, decadent trees. Most maternity colonies documented in California have been found in buildings.	Yes	Yes	Yes	
Sierra Nevada red fox	FSS/ST	High-elevation (from 5,000 feet to 7,000 feet); conifer forest, sub-alpine woodlands, and barren areas above treeline.	No	Yes	No	No effect; no known occurrences of Sierra Nevada red fox in the Project Area except anecdotal observations from 1972 and 1991
Pacific marten	FSS/–	High elevation (above 5,500 feet); mature mixed evergreen forests with 40% crown closure, large trees, and snags.	Yes	Yes	Yes	

[1]Status: FE = Federally Endangered; FD = Federally Delisted; FPT = Federal Proposed Threatened; FSS = Forest Service Sensitive; SE = State Endangered; ST = State Threatened; SCT = State Candidate Threatened; SSC = State Species of Special Concern

[2]See Section 5 for effects analysis

3.1 Valley Elderberry Longhorn Beetle

3.1.1 Distribution, Habitat, and Life History

The valley elderberry longhorn beetle is listed under the federal ESA as threatened. A California endemic species, the valley elderberry longhorn beetle is found in scattered populations throughout its range, which includes most of the Central Valley (Barr 1991).

Blue elderberry (*Sambucus nigra* subsp. *caerulea*) is the primary host plant for valley elderberry longhorn beetle. It is common along streambanks and in open places in forest throughout the California floristic province below 9,843 feet, and blooms from March to September (Baldwin et al. 2012). Larvae feed on tree pith, while adults eat the foliage and possibly the flowers of the plants. The adult stage of the valley elderberry longhorn beetle is short-lived, and most of the life cycle is spent in the larval stage (USFWS 1999). The adults are active from early March through early June with mating occurring in May (Barr 1991). Eggs are laid singly, or in small groups, in crevices in elderberry bark and hatch in about 10 days (Barr 1991). Larvae bore into the pith of elderberry roots, branches, and trunks to create an opening in the stem within which they pupate, remaining in this stage for one to two years before emerging as adults (Barr 1991, USFWS 1999). After metamorphosing into an adult, the beetle chews a circular exit hole through which it emerges, sometime during the period of late March to June (Barr 1991, USFWS 1999). It has been suggested that the beetle is a poor disperser, based on the spatial distribution of occupied shrubs (USFWS 1999).

The valley elderberry longhorn beetle appears to prefer larger, mature elderberry plants generally located below 500 ft elevation (USFWS 2017b). The USFWS Conservation Guidelines for the valley elderberry longhorn beetle consider plants with one or more stems measuring greater than or equal to 1 in in diameter to be potential habitat for the beetle (USFWS 2017b).

3.1.2 Occurrence in the Project Vicinity

During relicensing surveys, elderberry plants were found at eight sites along a transmission line corridor under 3,000 feet elevation (DTA 2004a). No elderberry plants were found at recreation access points or adjacent to any UARP dams, powerhouses, switchyards, or appurtenant facilities below 3,000 feet (DTA 2004a). In 2017, USFWS updated their framework for assessing impacts to the valley elderberry longhorn beetle and lowered the elevational limit for the species from 3,000 ft to 500 ft. The elderberry longhorn beetle does not occur in the Project Area since the ENF is located above 1,000 ft.

3.2 Western Bumble Bee

3.2.1 Distribution, Habitat, and Life History

Western bumble bee is designated as a Forest Service Sensitive (FSS) species. Once very common in the western U.S. and Canada, the western bumble bees have declined dramatically west of the Sierra-Cascade crest in the last 20 years. Western bumble bee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens (USFS 2014). This species uses flowering plants (such as *Melilotus*, *Cirsium*, *Trifolium, Centaurea*, *Chrysothamnus,* and *Eriogonum*) in flower-rich open grassy areas and forested openings, including montane meadows (Hatfield and LeBuhn 2007), urban parks and gardens, and chaparral and shrub areas (Williams et al. 2014, USFS 2014). Bumble bees do not depend on any one flower type, though some plants rely on bumble bees to achieve pollination. Underground cavities, primarily abandoned rodent burrows, are used for nest and hibernation sites for queens.

3.2.2 Occurrence in the Project Vicinity

Western bumble bee may occur in the Project vicinity. There are forested openings as well as many mesic to wet areas that consist of a mix of grasses and forbs. There are three western bumble bee records for the Eldorado National Forest (CDFW 2017).

3.3 Hardhead

3.3.1 Distribution, Habitat, and Life History

Hardhead is designated as a FSS species, and a California Species of Special Concern (SSC). Hardhead are widely distributed in low- to mid-elevation streams in the Sacramento- San Joaquin drainage. The hardhead range extends from the Kern River to the Pit River, and they are also present in the Russian River. In the San Joaquin drainage, hardhead is scattered in tributary streams and absent from valley reaches. In the Sacramento drainage, hardhead are present mostly in the Sacramento River and larger tributary streams. They are absent in San Francisco Bay streams except the Napa River (Brown and Moyle 1993, Moyle 2002, Saiki 1984). Hardhead tend to be absent in streams where introduced centrarchids (sunfishes) predominate, and streams that have been severely altered by human activity (Moyle 2002). Hardhead occur in streams that reach summer water temperatures greater than 68°F (20°C). Under laboratory conditions, their reported optimum water temperature range is 75.2°F to 82.4°F (24°C to 28°C) (Moyle 2002). Specialized habitat requirements combined with widespread alteration of lower watersheds has resulted in localized, isolated populations of hardhead (Moyle et al. 1995).

3.3.2 Occurrence in the Project Vicinity

Hardhead are present in the SF American River upstream and downstream of Slab Creek Reservoir, as well as in the reservoir itself (DTA and Stillwater Sciences 2005a, 2005b). Snorkel surveys conducted in the SF American River downstream of Slab Creek Reservoir revealed hardhead to be the most numerous species, though it was only in the lowest three miles of the reach where temperatures were presumably better suited for the species (Stillwater Sciences 2008).

3.4 Sierra Nevada Yellow-legged Frog

3.4.1 Distribution, Habitat, and Life History

Sierra Nevada yellow-legged frog (*Rana sierrae*) (SNYLF), formerly known as mountain yellow-legged frog (*Rana muscosa*), is now recognized as a separate species, as designated in Vredenburg et al. (2007). In April 2014, U.S. Fish and Wildlife Service listed SNYLF as federally endangered under the Endangered Species Act (USFWS 2014). SNYLF are also listed as threatened under the California Endangered Species Act and considered a FSS species. Critical Habitat for SNYLF has been delineated within the eastern portion of the UARP boundary, including Loon Lake and Rubicon River.

SNYLFs are found in deep, cold, perennial lakes, ponds, isolated pools, streams, and riverbanks in the Sierra Nevada Mountains at elevations typically ranging from 4,500 to 12,000 feet (USFWS 2014). During the active season, they prefer open, gently sloping shorelines with shallow water (2 to 3 inches deep) (Brown et al. 2014). Breeding activity begins soon after ice-melt in spring, ranging from April at lower elevations to June/July in higher elevations (AmphibiaWeb 2017). Eggs are deposited under water in clusters attached to rocks, gravel, vegetation, or under banks (AmphibiaWeb 2017). Permanent lakes or ponds that are deep enough as to not freeze to the bottom in winter or become anoxic (oxygen-depleted) may be required for breeding, because larvae require at least 2 to 3 years to reach metamorphosis (Matthews and Pope 1999). Successful breeding has rarely been observed in ponds less than 6.6 feet deep (Pope 1999, as cited in USFS 2014). SNYLFs also use streams, though little is known about the ecology of the species in stream habitats; anecdotal observations suggest that SNYLFs favor low- to moderate-gradient streams with low to moderate flows, perhaps due to scour risk at high flows (USFS 2014).

Typically, adults and larvae are found overwintering in lakes or ponds that are greater than 5.6 feet deep; however, adults have been known to emerge from waters in lakes less than 5 feet deep that were assumed to have completely frozen (Matthews and Pope 1999). In a high-elevation (11,380 feet) lake basin in Kings Canyon National Park, Matthews and Pope (1999) found post-metamorphic frogs in October, presumably exhibiting overwintering behavior, underwater in deep fractured bedrock crevices close to shore where water depths ranged between 0.7 feet and 4.9 feet. This suggests that at least some SNYLF adults overwinter in nearshore areas under ledges and in deep underwater crevices (it was previously assumed that adults may have exclusively used lake bottoms for overwintering) (Matthews and Pope 1999). Adults emerge from overwintering sites shortly after snow melts, and use rocks, crevices, ledges, or clumps of vegetation for cover (AmphibiaWeb 2017). SNYLFs appear to be absent from the smallest creeks, probably because these have insufficient depth for adequate refuge and overwintering (Jennings and Hayes 1994).

SNYLFs are highly aquatic, generally staying close to water and moving over a relatively small area. However, this species is capable of longer distance travel, typically along stream courses but also over dry land, in between habitats within lake complexes (Matthews and Pope 1999, USFWS 2016). The farthest reported distance for the species from water is 1,300 feet (Vredenburg et al. 2005). Stream corridors may be used for dispersal and adult frogs have been documented to move as much as 2 mi through stream systems within a single season (Wengert 2008, as cited in USFWS 2014). SNYLFs within habitat connected by lake networks or stream migration corridors display greater movement and home ranges; conversely, frogs located in a mosaic of fewer lakes or with greater distances between areas with high habitat value are not expected to move as far over dry land (USFWS 2016).

3.4.2 Occurrence in the Project Vicinity

SNYLFs have not been known historically or currently to occupy the reaches or reservoirs associated with the UARP Project (DTA and Stillwater Sciences 2005c). Visual encounter surveys were conducted for SNYLFs during relicensing efforts in 2003 and post-License monitoring surveys 2015 and 2017 (Table 3)(DTA and Stillwater Sciences 2005c, Stillwater Sciences 2015, Stillwater Sciences 2017). All surveys were conducted between the months of May and September, and survey conditions (e.g., weather, visibility) were suitable for detecting target amphibians. Loon Lake is located within designated USFWS Critical Habitat for SNYLF.

Table 3. Sierra Nevada yellow-legged frog survey sites in the UARP area, 2003–2017.

Site Code and Description	Survey Year	Number of Survey Visits
RR: Rubicon Reservoir margin	2003	2
RR-3: Rubicon River upstream of Rubicon Springs	2003	2
RR-4: Rubicon River downstream of Rubicon Springs	2003	2
Fox: Fox Lake margin	2003	1
RBR: Rockbound Reservoir margin	2003	2
RBP-1: Pond 1 near Rockbound	2003	1
RBP-2: Pond 2 near Rockbound	2003	1
RBP-3: Pond 3 near Rockbound	2003	1
RL-1: Highland Creek downstream of Rockbound Dam	2003	1
BIR: Buck Island Reservoir	2003	2
BI-3: Little Rubicon River downstream of Buck Island Dam	2003	2
LL-2: Loon Lake Reservoir at Toad Cove	2003	2
LL-4A: Loon Lake Reservoir	2003	1
LL-4B: Ellis Creek at Loon Lake Reservoir	2003	1
LL-8: Gerle Creek below cascade	2003	2
LL-10: Gerle Creek at Gerle Meadow	2003	2
LL-11A: Loon Lake Reservoir	2003	1
LL-11B: Unnamed tributary to Loon Lake Reservoir	2003	1
LL-P9: Loon Lake Reservoir Pond	2003	1
LL-P10: Loon Lake Reservoir Pond	2003	1
LL-P11: Loon Lake Reservoir Pond	2003	1
LL-P12: Loon Lake Reservoir Pond	2003	1
GC-6: SF Rubicon River upstream of Gerle Creek confluence	2003	2

Site Code and Description	Survey Year	Number of Survey Visits
GC-8: SF Rubicon River downstream of Forest Service road 13N29	2003	5
J-8: SF Silver Creek downstream of Peavine Creek	2003	2
IH-1: SF Silver upstream of Junction Reservoir	2003	3
IH-3A: SF Silver at burn area	2003	3
IH-3B: SF Silver at burn area	2003	3
UV-1: Jones Fork Silver Creek at Ice House Road	2003	5
UV-4A: Union Valley Reservoir margin	2003	3
UV-4B: Yellow Jacket Creek at Union Valley Reservoir	2003	3
Rubicon Reservoir shoreline near Rubicon Dam, and Rubicon River downstream of Rubicon Dam	2015	1
Buck Island Lake shoreline near Buck Island Dam, and Little Rubicon River downstream of Buck Island Dam	2015	1
Loon Lake Main Dam	2017	1
Loon Lake Dam Outlet	2017	1
Loon Lake Auxiliary Dam	2017	1
Loon Lake Helipad	2017	1
Loon Lake Meteorological Station	2017	1
Loon Lake Access Building and Switchyard	2017	1
Access Road to Loon Lake Switchyard	2017	1
Loon Lake Gate House and Access Road	2017	1
Access Road to Gerle Dam	2017	1
Gerle Dam	2017	1
Loon–Gerle Tunnel Area	2017	1
Gerle Quarry	2017	1
Gerle Canal	2017	1
Robbs Forebay Dam Area	2017	1

Site Code and Description	Survey Year	Number of Survey Visits
Robbs Peak Powerhouse and Switchyard	2017	1
Union Valley Dam	2017	1
Access Road to Union Valley Intake Structure and Dam	2017	1
Union Valley Intake Structure	2017	1
Union Valley Spillway	2017	1
Jones Fork Powerhouse and Switchyard	2017	1
Union Valley Bike Trail	2017	1
Ice House Dike	2017	1
Ice House Auxiliary Dam	2017	2
Ice House Main Dam and Spillway Access Road	2017	1
Ice House Spillway	2017	1
Ice house Access Road to Dam Outlet	2017	1
Ice House Intake Structure	2017	1
High Country Recreation Trail - above reroute	2017	1
High Country Recreation Trail - below reroute	2017	1

The closest documented occurrence of SNYLF near the Project Area is within 1,300 feet of Loon Lake, where one adult was detected in a small pond northeast of Loon Lake in 2004; none were detected during follow-up surveys at this location in 2005 and 2011 (CDFW 2017). The next closest detection is at an isolated pond located approximately 1.5 southwest of Rubicon Reservoir, where individuals were detected in 1997. At Lake Zitella and Highland Lake, located 1.5 and 2 miles, respectively, south of Rubicon Reservoir, numerous SNYLF of all life stages were detected as recently as 2013. Approximately 3 miles east of Union Valley Reservoir, one adult was detected in 1992 in Bassi Fork, a headwater stream connected to Union Valley Reservoir via Big Silver Creek (CDFW 2017). ENF and CDFW biologists have also found numerous SNYLF as recently as 2013 in McConnell Lake and Leland Lakes, between 2.5–3.5 miles south of Rubicon Reservoir. Lake Zitella, Highland Lake, McConnell Lake, and Leland Lakes are part of a complex of high-elevation (greater than 7,600 ft), predominantly exposed granite lakes located in the Desolation Wilderness, where SNYLF have been documented by ENF and CDFW biologists during multiple surveys as recently as 2013; each of these lakes eventually drains into either Rubicon or Rockbound reservoirs (CDFW 2017).

There is an estimated 38,870 ft of potentially suitable stream habitat within the UARP boundary. Of this, 11,750 ft is located within USFWS-designated Critical Habitat. These lengths are calculated by measuring all stream/tributary habitat (using the USGS National Hydrography Dataset [NHD]) above 4,500 ft elevation and within a 328-ft (100-m) buffer of Project reservoirs (i.e., measuring inlets and outlets of tributaries to reservoirs up to 328 ft [100 m]).

If a SNYLF is detected within the Project area, USFWS and USFS would be contacted immediately and consultation with the USFWS would be initiated.

3.5 Foothill Yellow-legged Frog

3.5.1 Distribution, Habitat, and Life History

Foothill yellow-legged frog (FYLF) is a FSS species and State SSC. Within California, FYLFs were historically found in the Sierra Nevada foothills, up to elevations of approximately 6,000 feet, and in the Coast Range from the Oregon border south to the San Gabriel River in southern California (Stebbins 2003). Currently, populations are thought to have disappeared from the southern Sierra Nevada foothills, in areas south of the Transverse ranges, and along the coast south of Monterey County (Jennings and Hayes 1994).

FYLFs are typically found in perennial streams or rivers, and intermittent creeks with pools. The species often breeds in low-gradient sections near junctions with tributary streams, due to the proximity of adult overwintering habitat in tributaries and to the presence of boulders and cobbles in these locations. Egg deposition usually occurs in cobble bars or under large boulders in areas of low-velocity flow. Tadpoles show affinity to the oviposition site, remaining in edgewater habitat with substrate interstices, vegetation, and/or detritus for cover. Adults prefer areas with exposed basking sites and cool, shady areas adjacent to the water's edge.

FYLF egg-laying (oviposition) typically begins during spring when flows diminish and average daily water temperatures consistently reach approximately 53–55 °F (12–13°C) (around April–May, depending on locale) (Kupferberg 1996). Warmer water temperatures accelerate egg mass development up to a critical thermal maximum temperature of 26°C (Duellman and Trueb 1986). Rainfall during the breeding season can delay oviposition (Kupferberg 1996). Eggs generally hatch within 5–37 days, depending on water temperatures (Zweifel 1955, Ashton et al. 1998). Tadpoles generally metamorphose within 3–4 months after hatching, prior to winter.

3.5.2 Occurrence in the Project Vicinity

Table 4 shows the results of surveys in the UARP area for FYLF during 2003–2004 relicensing surveys and during 2016–2017 post-License monitoring surveys. During 2016–2017 monitoring surveys, one FYLF was detected in Silver Creek below Camino Reservoir Dam near Camino Adit, as well as in a few wet off-channel and tributary areas near Camino Adit (SMUD 2017). During focused visual encounter surveys conducted in 2003–2004 during UARP relicensing studies, FYLF were documented at two sites in the UARP area: in Silver Creek below Camino Reservoir Dam (near Camino Adit, approximately 3.75 miles downstream of Camino Dam), and in Silver Creek just upstream of the confluence with the SF American River (DTA and Stillwater Sciences 2005c). In addition, there was an unconfirmed anecdotal sighting from 2003 along the South Fork American River downstream of Slab Creek Reservoir, near the confluence with Rock Creek. FYLFs were found in various locations along the South Fork American River near El Dorado Powerhouse and outside of the Project area in 2002 (CDFW 2017).

Table 4. Foothill yellow-legged frog survey sites and results in the UARP area, 2003–2017.

Site Code and Description	Survey Year(s)	Number of Survey Visits	Total Number of Foothill Yellow-legged Frogs Detected			
			Eggs	**Tadpoles**	**Subadults**	**Adults**
J-11: Silver Creek downstream of Junction Dam	2003–2004	1	-	-	-	-
J-12: Silver Creek 1 mile downstream of Junction Dam	2003–2004	1	-	-	-	-
J-13: Grey Horse Creek upstream of Silver Creek confluence	2003–2004	1	-	-	-	-
J-14: Unnamed tributary to Silver Creek, approximately 1 mile downstream of Junction Dam	2003–2004	1	-	-	-	-
J-15: Silver Creek upstream of Camino Reservoir	2003–2004	1	-	-	-	-
J-16: Little Silver Creek, approximately 0.5 miles upstream of Junction Reservoir	2003–2004	1	-	-	-	-
J-17: Little Silver Creek at Junction Reservoir	2003–2004	1	-	-	-	-
C-3: Silver Creek at Camino Adit	2003–2004	3	1	30	12	2
SFA-3: SF American River at El Dorado Powerhouse	2003–2004	3	4	1	5	1
SFA-4: Silver Creek at SF American Confluence	2003–2004	5	-	40	16	3
SFA-5: SF American River at Camino Powerhouse	2003–2004	1	1	-	-	-
BC-2: Brush Creek downstream of dam	2003–2004	3	-	-	-	-
SC-2A: SF American downstream of dam	2003–2004	3	-	-	-	-
SC-2B: Iowa Canyon Creek	2003–2004	3	-	-	-	-
SC-4: SF American River at White Rock Powerhouse	2003–2004	3	-	-	-	-
SC-6A: SF American River	2003–2004	3	-	-	-	-

Site Code and Description	Survey Year(s)	Number of	Total Number of Foothill Yellow-legged Frogs Detected			
SC-6B: Rock Creek at SF American River confluence	2003–2004	3	-	-	-	-
SC-7: SF American River at upstream of White Rock Powerhouse	2003–2004	1	-	-	-	-
SC-8: SF American River 1 mile downstream of Rock Creek	2003–2004	1	-	-	-	-
JD-A15: Silver Creek below Junction Reservoir Dam	2016	4	-	-	-	-
CD-A3: Silver Creek below Camino Reservoir Dam (near Camino Adit)	2016	7	-	-	-	1
CD-A4: Silver Creek below Camino Reservoir Dam (near confluence with SF American River)	2016	6	-	-	-	-
SCD-A1: SF American River below Slab Creek Reservoir Dam	2016	4	-	-	-	-
RC-A1: Rock Creek	2016	4	-	-	-	-
RPD-A1: SF Rubicon River below Gerle Creek	2016	1	-	-	-	-
JD-A15: Silver Creek below Junction Reservoir Dam	2017	3	-	-	-	-
CD-A3: Silver Creek below Camino Reservoir Dam (near Camino Adit)	2017	3	-	-	-	2
CD-A4: Silver Creek below Camino Reservoir Dam (near confluence with SF American River)	2017	3	-	-	-	-
RC-A1: Rock Creek	2017	3	-	-	-	-
SCD-A1: SF American River below Slab Creek Reservoir Dam	2017	2	-	-	-	-

3.6 Western Pond Turtle

3.6.1 Distribution, Habitat, and Life History

Western pond turtle (*Actinemys marmorata*) is a FSS species and State SSC. In California, this species is found from the Oregon border along the Pacific Coast Ranges to the Mexican border, and west of the crest of the Cascades and Sierras. Western pond turtles inhabit fresh or brackish water characterized by areas of deep water, low flow velocities, moderate amounts of riparian vegetation, warm water and/or ample basking sites, and underwater cover elements, such as large woody debris and rocks (Jennings and Hayes 1994). Along major rivers, western pond turtles are often concentrated in side channel and backwater areas. Turtles may move to off-channel habitats, such as oxbows, during periods of high flows (Holland 1994). Although adults are habitat generalists, hatchlings and juveniles require specialized habitat for survival through their first few years. Hatchlings spend much of their time feeding in shallow water with dense submerged or short emergent vegetation (Jennings and Hayes 1994). Although an aquatic reptile, western pond turtles require upland habitats for basking, overwintering, and nesting, typically within 0.6 mi from aquatic habitats (Holland 1994).

3.6.2 Occurrence in the Project Vicinity

Several western pond turtles have been documented in the UARP on the Slab Creek Dam Reach of the SF American River (DTA and Stillwater Sciences 2005c). The most recent sighting is on the SF American River downstream of Rock Creek in 2016 (SMUD, in prep.) While no western pond turtles were sighted during surveys conducted concurrently with amphibian studies during the SMUD relicensing process (DTA and Stillwater 2005c), there are other several past sightings along the SF American River. In 2003, three juvenile WPT were observed on the SF American River within the lower portion of the Slab Creek Dam reach by Jann Williams and Jens Hamar; one juvenile turtle was observed in August, approximately 0.5 mi upstream of White Rock Powerhouse, and two juveniles were observed in September just downstream of the Rock Creek confluence with the SFAR.

3.7 Bald Eagle

3.7.1 Distribution, Habitat, and Life History

Bald eagle is federally delisted, a FSS species, State-listed as endangered and State Fully Protected, and protected by the federal Bald and Golden Eagle Protection Act. This species is a year-round resident and uncommon winter migrant in California (Zeiner et al. 1990a). Breeding has been rebounding in the state during the last few decades; recent records document nesting in 41 of California’s 58 counties (CDFG 2009). Bald eagles breed at coastal areas, rivers, lakes, and reservoirs with forested shorelines or cliffs in northern California. Bald eagles winter throughout most of California in lower elevations, with large concentrations in the Klamath Basin (Zeiner et al. 1990a). The breeding season in California identified by the USFWS in the National Bald Eagle Management Guidelines extends from January through August (USFWS 2007); CDFW indicates that the season may extend through July or August (CDFW 2015).

Wintering bald eagles are associated with aquatic areas containing some open water for foraging. Bald eagles forage and scavenge within large bodies of water containing abundant fish, such as estuaries, coastal waters, rivers, large lakes, and reservoirs. While the bald eagles’ diets consist primarily of fish, they will also feed opportunistically on small mammals, birds, reptiles, and invertebrates. High snags, trees, and open rocky slopes provide hunting perches (Call 1978); open, easily approached perches and feeding areas are preferred.

The development of a bald eagle monitoring plan for the UARP is required within 6 months of license issuance under the License (FERC 2014). Management decisions affecting bald eagles is further directed by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA).

3.7.2 Occurrence in the Project Vicinity

Bald eagles have historically been documented nesting at Union Valley reservoir (at Granlees Point) and Loon Lake Reservoir (DTA and Santa Cruz Predatory Bird Research Group 2004, SMUD 2016). As recently as 2016, bald eagles nested at Union Valley Reservoir near Sunset Campground on Sunset Peninsula. Surveys were also conducted in 2016 at Ice House Reservoir and Loon Lake; there appeared to have been an unsuccessful nesting attempt at Loon Lake, and there was no nesting activity documented at Ice House Reservoir (SMUD 2016). Wintering and summer foraging bald eagles occur in other areas of the UARP as well.

3.8 Northern Goshawk

3.8.1 Distribution, Habitat, and Life History

Northern goshawk is FSS species and State SSC. This species is generally a year-round resident in California, but the species does exhibit some limited seasonal, altitudinal movements. The breeding stronghold is distributed across much of the northern Coast Ranges, the Klamath, Siskiyou, and Warner mountains, Cascades, Modoc Plateau, and through most of the Sierra Nevada (Keane 2008). The species nests in mature and/or old-growth forests, including within coniferous and mixed conifer-hardwood vegetation types; preferred stands are those with relatively large trees, high canopy cover, and an open understory (Keane 2008). Northern goshawk breeding in California typically begins during late spring or early summer (April to June), depending on the latitude (Zeiner et al. 1990a). Eggs are laid in mid-April to early May, incubation lasts about 30 days, and nestlings remain in the nest for 36 to 42 days, typically fledging from late June to late July. Goshawk territories are associated with larger patches of mature forest; occupancy of patches has been positively associated with patch area (Woodbridge and Detrich 1994). The breeding and nesting season occurs from between late March and mid- to late-August (Leslie in prep., as cited in USFWS 1998).

Often from a perching position in snags, the northern goshawk preys upon ground and tree squirrels, chipmunks, and a variety of bird species (e.g., robins, flickers, jays, etc.) (Squires and Reynolds 1997, Keane 2008). They are also known to feed on reptiles, insects, and occasionally carrion (Squires and Reynolds 1997). Many birds stay in their territories year-round, only leaving when prey is limited.

3.8.2 Occurrence in the Project Vicinity

Relicensing studies and ENF monitoring studies show that northern goshawks nest in the vicinity of the UARP (USFS 2004). There are an estimated 600 known goshawk territories on National Forest system lands in the Sierra Nevada, with about 70 of those occurring on the ENF. On the ENF, known goshawk sites appear to be fairly well-distributed across the forest, ranging between 4,000 and 7,000 feet in elevation (USFS 2004). Seven northern goshawk PACs are located within a 1-mile radius of the Project (Figure 2).

3.9 California Spotted Owl

3.9.1 Distribution, Habitat, and Life History

California spotted owl is a FSS species and State SSC. This species is a year-round resident in California, and breeds in the southern Cascades, the Sierra Nevada from Burney south, the Tehachapi Mountains, and the coastal range south of Monterey (Gutiérrez et al. 1995). California spotted owls typically occur in older forested habitats at elevations between 3,000 and 7,000 feet. They nest in complex stands with large trees dominated by hardwoods (primarily *Quercus* [oak] species), with conifer cover increasing with elevation (Gutiérrez et al. 1995). The species also requires some open areas for foraging as it hunts prey on the forest floor in woody debris. The California spotted owl's diet primarily consists of dusky-footed woodrat (*Neotoma fuscipes*) and northern flying squirrel (*Glaucomys sabrinus*), but they are also likely to feed on a variety of other small and medium-sized rodents, lagomorphs, birds, and bats. The California spotted owl breeding season is defined as 1 March through 15 August.

3.9.2 Occurrence in the Project Vicinity

Relicensing studies and ENF monitoring studies show that California spotted owl's nest in the vicinity of the UARP (USFS 2004). The USFS conducts ongoing, annual surveys in the ENF for California spotted owl, based on USFS-related projects currently in planning process during each year, and the University of Wisconsin conducts ongoing annual surveys in the Pacific Ranger District as part of a demographic population study (J. House, USFS, e-mail to H. Burger, Stillwater Sciences, on 16 March, 2017). The ENF occurs in the central portion of the California spotted owl's range and supports about 16% of the known population in the Sierra Nevada. On the ENF, spotted owls are known to occur between 2,000 and 7,200 feet in elevation. Twenty California spotted owl PACs are located within a 1-mile radius of the Project (Figure 2).

3.10 Willow Flycatcher

3.10.1 Distribution, Habitat, and Life History

Willow flycatcher is a FSS species and is State-listed as endangered. Although historically the willow flycatcher occurred throughout California in deciduous shrub and willow thicket habitats, it is currently only a rare summer resident in wet meadow and montane riparian habitats, at elevations of 2,000–8,000 feet, primarily in the Sierra Nevada and Cascade ranges (Craig and Williams 1998, Sedgewick 2000). Willow flycatcher is no longer present throughout most of its historical California range, but does rarely occur in riparian areas during the spring and fall migration periods.

Willow flycatchers require dense riparian shrubland, often thickets of willows or alder, near permanent standing water for foraging and roosting; however, areas with dense tree cover are not suitable. In addition, low, exposed branches are used during foraging (Zeiner et al. 1990a). Water is always present in willow flycatcher territories in California (Sedgewick 2000). Deciduous shrubs and small trees at least 6.6 feet tall are required for nesting (Craig and Williams 1998). Willow flycatcher nests are frequently parasitized by brown-headed cowbirds (*Molothrus ater*) (Craig and Williams 1998).

3.10.2 Occurrence in the Project Vicinity

No willow flycatchers were detected during protocol-level surveys conducted for UARP relicensing (DTA 2004d). Only marginally suitable habitat for willow flycatcher is available within Project Area. None of the meadows in the study area contain a significant shrub component and most lack willows (*Salix* sp.) entirely. A combination of poor habitat suitability, lack of willow flycatcher detections during the protocol-level surveys, and the absence of known willow flycatcher nesting territories in the vicinity of the UARP suggest that meadows in the study area cannot support willow flycatcher under current conditions. Additionally, only one meadow complex in the study area—at 38.8 acres—exceeds the 15-acre size criterion for "emphasis habitat" as defined in the Sierra Nevada Forest Plan Amendment (USFS 2004). Due to their absence from the Project Area, there will be no Project-related effects on willow flycatcher and this species is not discussed further.

3.11 Townsend's Big-Eared Bat

3.11.1 Distribution, Habitat, and Life History

Townsend's big-eared bat is a FSS species, a candidate for State listing as threatened, and a State SSC. This species occurs throughout California and is associated with caves and structures in a variety of habitats from deserts to coastal scrub to montane forests. Townsend's big-eared bats have been documented from sea level to 10,800 feet, although in California maternity roosts appear to be confined to elevations below 5,900 feet (Pierson and Fellers 1998, Sherwin and Piaggio 2005).

This cavity-dwelling species roosts and hibernates in caves (commonly limestone or basaltic lava), mines, buildings, bridges (with a cave-like understructure), rock crevices, tunnels, basal hollows in large trees, and cave-like attics (Pierson and Fellers 1998, Pierson and Rainey 2007, Pierson et al. 2001, Pierson and Rainey 1996, Sherwin et al. 2000, Sherwin and Piaggio 2005). Townsend's big-eared bats breed in both transitory migratory sites and hibernacula between September or October and February (CDFW 2013). The maternity season extends from 1 March through 31 October, with colonies forming between March and June and breaking up by September or October (CDFW 2013). Maternity colonies and winter hibernacula (found in caves, tunnels, mines, and buildings [Zeiner et al. 1990b]) are particularly sensitive to disturbance.

Townsend's big-eared bat is a moth specialist with over 90% of its diet composed of lepidopterans. Foraging habitat associations include edge habitats along streams, adjacent to and within a variety of wooded habitats. These bats often travel large distances while foraging, including movements of over 150 kilometers during a single evening (Sherwin et al. 2000). Evidence of large foraging distances and large home ranges has also been documented in California (Pierson and Rainey 1996).

3.11.2 Occurrence in the Project Vicinity

No Townsend's big-eared bats were documented during bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing in 2002–2003 (DTA 2004e). The closest documented occurrence of Townsend's big-eared bat is approximately 10 miles to the northwest of the UARP (CDFW 2017). While comprehensive surveys for this species have not been conducted in the Project Area, there are cliffs, rock crevices, snags, and tree hollows within the vicinity of the Project which may provide suitable day or night roosting habitat for this species. There are numerous caves and abandoned mines in El Dorado County that may provide suitable hibernacula, though none are known within or immediately adjacent to the Project Area.

3.12 Pallid Bat

3.12.1 Distribution, Habitat, and Life History

Pallid bat, a FSS species and State SSC, is fairly widespread in California. Pallid bats occupy a variety of habitats, from arid deserts to grasslands, to conifer forests and riparian areas. Roosts (including day, night, and maternity roosts) are typically located in rock crevices and cliffs; day roosts can also be found in tree hollows and caves (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996, Pierson et al. 2001). In more urban settings, roosts are frequently associated with human structures, such as abandoned buildings, abandoned mines, and bridges (Pierson et al. 1996, Pierson et al. 2001). Overwintering roosts require relatively cool and stable temperatures out of direct sunlight. Pallid bats typically glean prey from the ground, and may forage 1–3 mi from their day roosts (Zeiner et al. 1990b). Pallid bats eat a variety of insects and arachnids, including beetles, moths, spiders, and scorpions (Zeiner et al. 1990b).

The pallid bat is a colonial species, with a typical maternity colony size of 50 to 300 individuals (Hermanson and O'Shea 1983, Lewis 1994, Pierson et al. 1996). Breeding occurs from late October to February. With an average litter size of two, the young are born between April and July, and are typically weaned in August (Sherwin and Rambaldini 2005). The maternity season extends from 1 May through 31 October and the hibernacula season includes 1 November through 1 April (WDFW 1994, as cited in WDFW 2004; Western Bat Working Group 2015).

3.12.2 Occurrence in the Project Vicinity

No pallid bats were documented during bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing in 2002–2003 (DTA 2004e). There are cliffs and rock crevices within river canyons, as well as snags and large tree hollows within the vicinity of the Project, which may provide suitable roosting habitat for this species.

3.13 Fringed Myotis

3.13.1 Distribution, Habitat, and Life History

Fringed myotis, a FSS species, is fairly widespread throughout the western United States and California. These bats occur primarily at middle elevations in desert, riparian, grassland, and woodland habitats, but they have been recorded at 9,350 feet in spruce-fir habitat in New Mexico, and at low elevations along the Pacific Coast (Barbour and Davis 1969, NatureServe Explorer 2015). Roosts are in caves, mines, cliff faces, rock crevices, old buildings, bridges, snags, and other sheltered sites (Barbour and Davis 1969, Weller and Zabel 2001, Lacki and Baker 2007). In spring and summer in northern California, the bats roosted in snags in early to medium stages of decay and switched roosts often (Weller and Zabel 2001). The maternity season extends from 1 April through 30 September (Zeiner 1990b; Herren and Luce 1997, as cited in Keinath 2003) and the hibernacula season includes 1 October through 31 March (Zeiner 1990b). Winter hibernacula are poorly known, but likely include caves, mines, and buildings. Diet includes various arthropods (especially moths and beetles, but also spiders) captured in flight or gleaned from plants. Foraging often occurs close to vegetative canopy (NatureServe Explorer 2015).

3.13.2 Occurrence in the Project Vicinity

During bat trapping, roost surveys, and acoustic surveys conducted in the vicinity of the Project for UARP relicensing, one fringed myotis was captured on 18 July 2002, at Silver Creek in the vicinity of the Junction Reservoir intake (DTA 2004e). There are also cliffs, rock crevices, snags, and tree hollows within the vicinity of the Project which may provide suitable roosting habitat for this species.

3.14 Sierra Nevada Red Fox

3.14.1 Distribution, Habitat, and Life History

The Sierra Nevada red fox, one of 10 subspecies of red fox in North America, occurs in two small and isolated populations in the Sierra Nevada mountains of California. Historically, the species is thought to have occupied the high elevation areas of the Sierra Nevada and Cascade mountain ranges from Tulare County, California, north to the Columbia River in Oregon. Currently the Sierra Nevada red fox's distribution is thought to be restricted to two small populations: one in the vicinity of Lassen Peak at the most southerly extent of the Cascades range, and one in the vicinity of Sonora Pass, approximately 160 miles to the south in the Sierra Nevada range. The Lassen Peak study (Perrine 2005) found that red fox distribution changed seasonally with movement in the winter at lower elevations down to 4,700 feet. In the summer, the foxes used higher elevations usually over 6,000 feet. Habitat used in the Lassen Peak region included barren, high-elevation conifer (red fir, sub-alpine conifer), mid-elevation conifer (lodgepole pine, Sierra mixed conifer, and white fir), shrub (montane chaparral), and hardwood-herbaceous (annual grassland, aspen, montane hardwood, montane riparian and wet meadow) (Perrine 2005).

While the Sierra Nevada red foxes' diet is primarily small rodents, they are often opportunistic predators and foragers, feeding on insects, berries, and other vertebrates, including deer carrion and lagomorphs in the winter.

3.14.2 Occurrence in the Project Vicinity

CNDDB lists two historic occurrences of Sierra Nevada red fox: anecdotal observations near Icehouse Reservoir from 1972, and a sighting along the road to Loon Lake in 1991 (CDFW 2017). Systematic follow-up surveys conducted by Zielinski from 1996–1999 using baited track plates and camera stations did not find evidence of this species (CDFG 2017). There are no other known occurrences of Sierra Nevada red fox in the UARP area, based on review of available literature resource databases as well as consultation with resource agency personnel; however, suitable habitat exists at higher elevations of the Project Area and the species may occur in very low numbers (DTA 2004f). Sierra Nevada red fox occurs most frequently above 7,000 feet elevation, which exceeds the maximum elevation of UARP facilities.

3.15 Pacific Marten

3.15.1 Distribution, Habitat, and Life History

Pacific marten is a carnivore that occupies high-elevation (5,000–10,000 feet), late-successional conifer forests in the Sierra Nevada (Spencer et al. 1983, Zielinski et al. 1995). Historically, the Sierra Nevada marten occurred from Trinity and Siskiyou counties east to Mt. Shasta and south through the Sierra Nevada to Tulare County (Kucera et al. 1995).

In the Sierra Nevada, marten maintain large home ranges in mature forests of lodgepole pine, red fir, and Sierran mixed conifer with complex ground structure (Zielinski et al. 1997). This species uses large diameter trees, snags, and down logs, with moderate-to-high canopy closure and an interspersion of riparian areas and meadows (USFS 2004). They generally avoid habitats that lack overhead cover. Various studies in the Sierra Nevada indicate that the marten has strong preferences for forest-meadow edges, and riparian forests appear to be important foraging habitats (Spencer et al. 1983, Martin 1987). Natal dens are typically found in cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas. Winter resting sites are typically in decayed wood beneath snow (Spencer 1987); summer resting sites are often in dense tangles of wind-thrown trees (Stone 2010) but also include live tree platforms, canopies, cavities, squirrel nests, logs, stumps, slash or log piles, tree root masses, shrubs, or rock or boulder piles.

Pacific martens are carnivorous, and primarily feed on small mammals like rodents, shrews, and lagomorphs on the ground as well as in trees. They are also seen eating fish, foraging for them along the edge of the water, and often eat birds, insects, and fruits outside of the winter season (Haley 1975 as cited by Zeiner et al. 1990b).

3.15.2 Occurrence in the Project Vicinity

The ENF has numerous records of marten from throughout the forest. Most of these observations are from the southwest corner of the Desolation Wilderness, but unverified observations have also been reported from near Ice House Road and upper Tells Creek (DTA 2004d). Suitable habitat is present throughout much of the Project Area located above 5,000 feet. CNDDB lists several marten observations on the Eldorado National Forest, predominantly above 6,000 feet in elevation (CDFW 2017).

4 EFFECTS OF THE PROPOSED PROJECT

This section discusses the potential effects of the Project on each of the TES terrestrial and aquatic wildlife species identified as most likely to occur in the Project Area using Risk Assessments (described in Section 5.1) and evaluating other feasible scenarios by which TES wildlife may be directly or indirectly affected. While SNYLF has not been documented in the Project Area, an evaluation of potential effects on the species is also included since Critical Habitat overlaps with the Project Area.

The primary scenarios in which the Project could directly or indirectly affect terrestrial wildlife resources are those involving both herbicide application or mechanical treatments, and include: (1) direct sprays or spray drift onto the animal, (2) consuming herbicide-contaminated water, prey, or plants, (3) removal of habitat elements that provide nesting, foraging, or resting (e.g., trees, shrubs), or (4) disturbance resulting from human presence and noise associated with vegetation management actions.

The primary scenarios in which the Project could directly or indirectly affect aquatic wildlife resources are those involving herbicide applications and the potential for these herbicides to enter the watercourses. These could include: (1) the accidental direct application or spill of herbicides, (2) herbicide drift from adjacent treated areas, (3) herbicide runoff or mobilization following rainfall, or (4) herbicides leaching into groundwater and entering the watercourse. Exposure of aquatic organisms to certain herbicides has been shown to result in effects to metabolism, growth, sexual development and reproduction, and mortality; however, in general, the active ingredients in herbicides are active against the metabolic activities of plants, not animals. The risk assessments provide the majority of this analysis.

4.1 Risk Assessments

An evaluation of the effects of herbicide application on TES terrestrial and aquatic wildlife species requires a careful assessment of risk to these species. The sections that follow include Risk Assessments for applying each of the nine herbicides proposed for use in the VIWMP.

Herbicide risk to wildlife depends upon both: (1) the toxicity of the herbicide to a particular receptor (organism) and (2) the degree of exposure of the organism to the material. The toxicity is determined by research trials during the development of the chemical or other studies designed to specifically identify the toxicity of the chemical on a particular reference taxon. Commonly, a Toxicity Reference Value (TRV) is determined using standard LD50 or LC50 values (Lethal Dose or Lethal Concentration at which 50 percent of the population experiences mortality) and applying an uncertainty factor or determining the No-Observed-Adverse-Effect Level (NOAEL), the maximum concentration at which no statistically significant adverse effects are observed in a population. These values are inherent to the chemical and its bio-activity and cannot be changed.

The other part of risk is likelihood of exposure, which is variable. One of the biggest factors affecting exposure levels in the application of herbicides is the application rate. Rates can be adjusted to the lowest levels possible while still meeting the objective of controlling vegetation. The application rate depends on many factors including, among others: growth stage of vegetation, desired ground conditions, application method and concentration of herbicide in solution. More importantly, other factors—which are in the control of the applicators—can be used to mitigate exposure levels. These are the Resource Protection Measures and BMPs that would be employed in the field. Of primary importance are buffers around sensitive sites, but other significant factors include: seasonal timing to avoid sensitive resources and application when conditions minimize movement from intended targets. The UARP VIWMP incorporates a large number of Resource Protection Measures and BMPs to reduce the exposure factor.

To assess the risk associated with the use of a specific pesticide, SMUD uses Risk Assessment Worksheets (WorksheetMaker, version 6.01.16), which are a computational tool developed by Syracuse Environmental Research Associates, Inc. (SERA) for the USFS. These are models that attempt to quantify the risk to various receptors based on TRVs and assumed exposure scenarios, which are typically very conservative and do not consider mitigating Resource Protection Measures employed by applicators. These worksheets are designed to facilitate risk assessment by comparing a potential exposure dose with the daily reference dose (RfD) established by the U.S. EPA (EPA). The RfD is a level of exposure at or below which no acute or chronic health effects are expected to occur; it can be considered the equivalent of an acceptable daily intake. Risk is expressed in the form of a hazard quotient, which is computed as the ratio of proposed exposure dose to the RfD. Hazard quotients ≤1.0 are considered by the USFS to pose insignificant risk to human health or the environment. That, however, is only a portion of the risk assessment process. Resource Protection Measures must be considered as well as other qualitative information specific to the Project.

For analyzing risk associated with the VIWMP, the following assumptions were incorporated into the SERA Risk Assessment Worksheets:

- Backpack directed foliar application (Backpack application models were used where available in the SERA worksheets since this is the most common type of application being proposed in the UARP; however, it should be noted that the backpack model uses a low boom application with fine-medium/coarse droplets anyways for off-target drift estimates.)
- Maximum application rates listed in Table 5
- A central application volume[2] of 20 gallons/acre
- One application at an interval of one day
- Pond surface area for spill of 1,000 square meters, at a depth of 1 meter
- Stream length of 1,038 feet and width of 6 feet, at a flow rate of 710,000 liters per day
- Chronic exposure length of 90 days

Table 5. Proposed Chemicals and Application Rates

Chemical	**Proposed Maximum Application Rate**
Aminopyralid	0.11 a.e. lb/ac
Chlorsulfuron	0.05 a.i. lb/ac
Clopyralid	0.14 a.e. lb/ac
Glyphosate	2 a.e. lb/ac
Imazapyr	0.33 a.e. lb/ac
Sulfometuron Methyl	0.14 a.i. lb/ac
Triclopyr (TEA)	2 a.e. lb/ac
Triclopyr (BEE)	2 a.e. lb/ac

Application rate units: acid equivalent pounds per acre (a.e. lb/acre) or active ingredient ponds per acre (a.i. lb/ac)

SERA states in their publication, Preparation of Environmental Documentation and Risk Assessments for the USFS, that a deeper understanding and appreciation of the qualitative discussion on risk may be more important than the numbers produced by the worksheets (SERA 2014). It is important to remember that many of the herbicides will be used in limited situations. For example, Sulfometuron Methyl will only be used in switchyards and around a limited number of other facilities where bare-ground conditions are desired and there are already limited chances for sensitive plants or animals to be nearby. Other herbicides like Clopyralid and Aminopyralid will be used to control certain difficult-to-control noxious weed species. Many of the herbicides proposed are approved for use in aquatic habitats and will often

[2] The central application volume is the most likely to be prescribed, and is therefore the volume that is assessed.

be applied in concentration volumes that fall within the lower to mid rates considered in the Risk Assessments, and then only to the lower 24 inches of vegetation to retard drift potential. In most cases where herbicides are being used in the UARP, applications will be made with backpack sprayers using medium-coarse droplets and targeted to specific types of plants so the chance for off-target impacts will be extremely low. Furthermore, review of the soils within the UARP (NRCS Soil Data for the ENF) indicates that the majority of soils in the Project Area consist of silts and loams with little pure clay soils, and runoff potential is reduced significantly on loam and sandy soils. Therefore, the chances for runoff-induced impacts would also be low.

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species, and are an important tool to mitigate potential adverse impacts to humans and natural resources. Dyes are not regulated as a pesticide and are not considered toxic to wildlife, plants or humans. Surfactants help the absorption of herbicide mixture into the plant. Competitor® (Wilbur-Ellis Company), the brand of surfactant to be used for the Project, is a modified vegetable oil containing a non-ionic emulsifier system. There is little information in the scientific literature on effects of seed-oil surfactants on aquatic organisms (Bakke 2007); since these products are derived from food grade vegetable oils, they are expected to have minimal, if any, effects on aquatic wildlife. Polyethoxylated tallow amines (POEAs), used in some herbicide formulations, are known to be toxic to fish and cause estrogenic effects in amphibians; these types of surfactants will not be used.

4.2 Direct and Indirect Effects

This section describes the potential for direct or indirect effects on aquatic and terrestrial TES wildlife species during implementation of the proposed Project. For each species or group of similar species, there is first an environmental risk assessment for each Project-specific herbicide, followed by an evaluation and discussion of the potential for Project-related effects.

4.3 Valley Elderberry Longhorn Beetle and Western Bumble Bee

In 2009, USFWS issued a BO on the Issuance of a New License for the UARP (USFWS 2009), which evaluated the effects of the UARP on valley elderberry longhorn beetle. The BO concluded that the UARP is not likely to jeopardize the continued existence of the valley elderberry longhorn beetle based on SMUD implementing annual employee awareness training, compliance with the USFWS Conservation Guidelines for the valley elderberry longhorn beetle (USFWS 1999), and compensation in the case of unavoidable loss of habitat. In 2017, USFWS updated their framework for assessing impacts to the valley elderberry longhorn beetle and lowered the elevational limit for the species from 3,000 ft to 500 ft. The valley elderberry longhorn beetle does not occur in the Project Area since the ENF is located above 1,000 ft. Therefore, the Project will have no effect on elderberry longhorn beetle.

Table 6 provides hazard quotients for acute exposure scenarios for western bumble bee. No chronic exposure scenarios were evaluated for terrestrial invertebrates because the opportunity for chronic exposure is extremely low.

Table 6. Hazard Quotients for Acute Exposure Scenarios for terrestrial invertebrates: western bumble bee[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Bee, 100% absorption	17.6	1,075	0.02	No
Chlorsulfuron	Bee, 100% absorption	76.9	25	3	Yes
Clopyralid	Bee, 100% absorption	22.4	909	0.02	No
Glyphosate (less toxic formulations)	Bee, 100% absorption	137.2	860	0.2	No
Imazapyr	Bee, 100% absorption	22.6	860	0.03	No
Sulfometuron methyl	Bee, 100% absorption	22.4	1,075	0.02	No
Triclopyr (BEE)	Bee, 100 % absorption	137	620	0.2	No
Triclopyr (TEA)	Bee, 100% absorption	137	620	0.2	No
Triclopyr (TCP)	NA	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

Direct effects on western bumble bee may occur if bees are directly sprayed with herbicide, or potentially if they foraged on recently treated flowering plants. The risk for direct effects on western bumble bee due to direct exposure to herbicides based on the derived hazard quotients for acute exposure scenarios is negligible for each Project herbicide, except for Chlorsulfuron (Table 6).

Chlorsulfuron exceeds the level of concern threshold for acute exposure scenarios for terrestrial invertebrates. However, the application period for Chlorsulfuron is November through March, which is outside of the blooming period for most flowering plants, and thus outside of the active western bumble bee foraging period. In addition, Chlorsulfuron is typically used as a pre-emergent and in bare ground treatments, thus no impacts on established forage plants would occur.

Western bumblebees could be indirectly affected by actions described in the VIWMP; if herbicide use eliminated important forage plants for bumblebees, populations could suffer. The UARP transmission corridor is maintained in an artificial, open canopy condition, which allows many species of herbaceous flowering plants to thrive with the increased sunlight, especially after thick brush removal. This open canopy condition with a variety of herbaceous, flowering plants provides good habitat for western bumblebees, which feed on many types of flowering plants. With the wire zone-border zone concept of vegetation management proposed in the VIWMP, SMUD will only use targeted applications of herbicides to maintain the open condition of the right-of-way. This strategy will continue to promote the growth of low-growing shrubs and herbaceous plants that will serve to increase forage for pollinators, including bumblebees. Additionally, SMUD's VIWMP will target invasive species within the right-of-way (and everywhere in the UARP), which will benefit the native plant species utilized by bumblebees. There will be no broadcast applications of herbicide that could lead to the loss of forage; therefore, the VIWMP may benefit bumblebee populations. Overall, the Project may affect individuals, but is not likely to result in a trend toward federal listing for western bumble bee.

4.4 Hardhead

Tables 5 and 6 provide hazard quotients for acute/accidental exposure scenarios and chronic exposure scenarios for hardhead.

Table 7. Hazard Quotients for Acute/Accidental Exposure Scenarios for sensitive fish species: hardhead[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Fish, sensitive species	0.07	50	0.001	No
Chlorsulfuron	Fish, sensitive species	0.03	30	0.001	No
Clopyralid	Fish, sensitive species	0.10	103	0.0009	No
Glyphosate (less toxic formulations)	Fish, sensitive species	1.36	0.5	3	Yes
Imazapyr	Fish, sensitive species	0.56	10.4	0.05	No
Sulfometuron methyl	Fish, sensitive species	0.10	7.3	0.01	No
Triclopyr (BEE)	Fish, sensitive species	1.36	0.09	15	Yes
Triclopyr (TEA)	Fish, sensitive species	1.36	20	0.07	No
Triclopyr (TCP)	Fish, sensitive species	0.01	0.18	0.03	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 8. Hazard Quotients for Chronic Exposure Scenarios for sensitive fish species: hardhead[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Fish, tolerant species	0.004	1.36	0.003	No
Chlorsulfuron	Fish, sensitive species	0.00003	3.2	0.000009	No
Clopyralid	Fish, sensitive species	0.001	10	0.0001	No
Glyphosate	Fish, sensitive	0.0004	0.5	0.0008	No

(less toxic formulations)	species				
Imazapyr	Fish, sensitive species	0.002	4	0.0006	No
Sulfometuron methyl	Fish, sensitive species	0.000006	1.17	0.000005	No
Triclopyr (BEE)	Fish, sensitive species	0.000004	0.019	0.0002	No
Triclopyr (TEA)	Fish, sensitive species	0.002	7.4	0.0003	No
Triclopyr (TCP)	Fish, sensitive species	0.0001	0.18	0.0006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Direct effects on hardhead associated with herbicide application would be in streams or reservoirs, namely the SF American River upstream and downstream of Slab Creek Reservoir, or in the reservoir itself. The risk for effects on hardhead from herbicides due to acute (accidental) or chronic exposure based on the derived hazard quotients is negligible (Tables 7 and 8), except for an exceedance in level of concern for acute (accidental) exposure to Glyphosate or Triclopyr (BEE). This risk assessment takes into consideration the worst-case circumstance by which exposure would occur; the scenarios where hazard quotients exceed a level of concern involve accidental exposure including large spills of 50 gallons of solution for the upper exposure levels, and subsequent daily exposure of target fish to large volumes of contaminated water for 90 days. However, the risk from an accidental spill of herbicide into a stream or reservoir in the Project Area is very low. In addition, this spill scenario is highly unlikely in the field because a majority of applications will be made using backpack applicators which have a capacity of three gallons. In addition, a 300-ft buffer from streams for application, mixing, and loading minimizes the possibility of occurrence of such accidental exposures.

Additional Water Quality Protection Measures (e.g., having a spill contingency plan, using ground-based application equipment, applying herbicide during favorable weather conditions, using low-pressure spray nozzles that produce large droplets, etc.) will also minimize the risk of herbicides to enter the SF American River in concentrations that could affect hardhead. Additionally, the large volume of water in the SF American River would further dilute any herbicide, if any unexpectedly reached the river either through a direct spill or through runoff. SMUD will also implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for hardhead.

4.5 Sierra Nevada Yellow-legged Frog and Foothill Yellow-legged Frog

Impacts on amphibians could occur during Project activities if these animals come into direct contact with herbicides during vegetation management within the UARP. Tables 9 and 10 provides hazard quotients for acute and chronic exposure scenarios for amphibians based on backpack directed foliar application. See the Risk Analysis section (4.1) for information on assumptions and surfactants.

Table 9. Hazard Quotients for Acute Exposure Scenarios for amphibians: Sierra Nevada yellow-legged frog and foothill yellow-legged frog (SERA 2007)[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Hazard Quotient[3]	Toxicity Value mg/kg	Exposure[2] Estimate mg/kg (Upper Limit)	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Amphibian, sensitive species	0.4996	0.005	95.2	0.666	0.007	No
Chlorsulfuron	Fish, sensitive species	0.0329	0.001	30	0.072	0.002	No
Clopyralid	Fish, sensitive species	0.0954	0.0009	103	0.208	0.002	No
Glyphosate (less toxic formulations)	Amphibian, sensitive species	1.3626	0.004	340	3.028	0.009	No
Imazapyr	Fish, sensitive species	0.5564	0.05	10.4	1.495	0.1	No
Sulfometuron methyl	Fish, sensitive species	0.0954	0.01	7.3	0.208	0.03	No
Triclopyr (BEE)	Amphibian, sensitive species	1.3626	**14**	0.1	3.028	**33**	**Yes**
Triclopyr (TEA)	Amphibian, sensitive species	1.3626	0.01	125	3.028	0.02	No
Triclopyr (TCP)	Fish, sensitive species	1.3626	**8**	0.18	6.056	**34**	**Yes**

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 10. Hazard Quotients for Chronic Exposure Scenarios for amphibians: Sierra Nevada yellow-legged frog and foothill yellow-legged frog[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exposure[2] Estimate mg/kg (Upper Limit)	Hazard Quotient3	Exceeds Level of Concern?
Aminopyralid	Amphibian, sensitive species	0.004	1.36	0.00005	0.029	0.0003	No
Chlorsulfuron	Fish, sensitive species	0.00003	3.2	0.000009	0.00004	0.00001	No
Clopyralid	Fish, sensitive species	0.001	10	0.0001	0.002	0.00008	No
Glyphosate (less toxic formulations)	Amphibian, sensitive species	0.00004	1.8	0.0002	0.012	0.006	No
Imazapyr	Fish, sensitive species	0.002	4	0.0006	0.040	0.01	No
Sulfometuron methyl	Fish, sensitive species	0.000006	1.17	0.000005	0.00001	0.000008	No
Triclopyr (BEE)	Fish, sensitive species	0.000004	0.019	0.0002	0.0001	0.007	No
Triclopyr (TEA)	Fish, sensitive species	0.002	7.4	0.0003	0.120	0.02	No
Triclopyr (TCP)	Fish, sensitive species	0.0001	0.18	0.0006	0.004	0.02	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

The risk for direct effects on SNYLF and FYLF due to direct exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios is negligible for each Project herbicide, except for acute effects from Triclopyr (BEE) (Tables 9 and 10). Because triclopyr BEE and TEA are relatively quickly metabolized to TCP (3,5,6-trichloro-2-pyridinol), which is also toxic to some organisms, it is considered in the risk assessments but it is not the active ingredient in any material that will be applied. Therefore, the analysis for triclopyr BEE serves as an analog for TCP. Of the herbicides proposed for use under the VIWMP, Triclopyr (BEE) has the most toxic properties for aquatic resources, and as such it will only be used in limited basal applications, and will not be used within 300 feet of manmade or natural watercourses (a list of watercourse buffers is provided in Table 11). In addition, spraying would not occur within 24 hours of a significant rain forecast of greater than a 30% chance of precipitation and would not occur when soils are saturated. The soils found in the Project Area are typically well-drained, which is conducive to herbicide leaching but not to transporting herbicides via runoff. The generally low organic component, in comparison to agricultural or grasslands, tend to create a low sorption potential, which when combined with higher permeability, could increase the potential for groundwater contamination (Huddleston 1996). Considering this, it is possible, though improbable, that Triclopyr (BEE) could contaminate groundwater and subsequently enter the watercourses in the Project Area. However, the use of backpack sprayers using target application instead of broadcast application, in combination with the herbicide exclusion buffers, should protect against this.

Table 11. Watercourse Buffers[1]

Herbicide[2]	Constructed Water Conveyance and Storage Structures[3]	Natural Watercourses[4]
Aminopyralid	25 feet	100 feet
Chlorsulfuron	25 feet	100 feet
Clopyralid	25 feet	100 feet
Glyphosate (less toxic/aquatic formulations)	10 feet	50 feet
Imazapyr	10 feet	50 feet
Sulfometuron methyl	25 feet	100 feet
Triclopyr (BEE)	300 feet	300 feet
Triclopyr (TEA)	10 feet	100 feet

[1] Buffer distances for aquatic features should be measured from the edge of the stream channel, or the edge of the special aquatic feature, or the extent of the wetted area, whichever is greater.
[2] Herbicide application within 300-ft of natural water courses water will be cut stump, hack and squirt, or direct foliar methods only.
[3] Man-made water conveyance or storage structures directly associated with engineered Project facilities, such as dams, groins, spillways, canals, flumes, weirs, etc.
[4] Natural watercourses are perennial or seasonal streams, wetlands, or intermittent channels

Glyphosate will often be used for vegetation treatments near water. There have been concerns regarding the toxicity of Glyphosate-based herbicides to amphibians because of internal surfactants—Polyethoxylated tallow amines (POEAs)—used in some formulations, which are known to be toxic to aquatic species like fish and amphibians. Rodeo/Aquamaster/Roundup Custom (the brand names of the glyphosate formulation to be used for the Project) do not include this surfactant. These brands represent the least toxic formations of glyphosate-based herbicides. Competitor®, the surfactant that will be used with glyphosate, was designed specifically for use in water and contains an alkyl ethoxylate instead of nonyl phenol ethoxylate (NPE), which is associated with endocrine disrupting effects in aquatic ecosystems. This will further mitigate risk associated with the use of glyphosate. Competitor has only slight acute toxicity to aquatic organisms, and it is one of the least-toxic surfactants used as an herbicide adjuvant (Pesticide Research Institute 2010). In addition, glyphosate rapidly and tightly binds to soil. As a result, glyphosate essentially becomes inactive as an herbicide upon contact with the soil. Due to this very high adsorption to soil, there is little potential for leaching or runoff; even when applied on asphalt or concrete the glyphosate that might runoff would enter the soil and quickly adsorb to soil particles. Glyphosate is so sensitive to soil, that excessive dirt or dust on the leaf at time of application, or the use of mixing water that is dirty or high in mineral content, can severely reduce the efficacy of the herbicide. Residue can be detected 60 days post-application although there is no herbicidal activity. Glyphosate is degraded via microbial activity. It has a half-life of 47 days, but immediate metabolites are more persistent with a 60-to-90-day half-life. Glyphosate is very persistent in water with a half-life of 12 days to 10 weeks. The presence of minerals or organic matter in water will tightly bind glyphosate, making it unavailable as herbicide, despite its persistence in the aquatic environment.

The probability that SNYLFs occur in the Project Area is very low, based on the lack of SNYLF detections during repeated visual encounter surveys conducted during relicensing surveys in 2003 and 2017 surveys in support of the VIWMP, as discussed in Section 3.4.2. Furthermore, SMUD will conduct surveys for SNYLF at all Project facilities located over 4,500 ft elevation where herbicide use is planned near water in 2018. Also, as part of License compliance, SMUD is developing and will implement a SNYLF Monitoring Plan through Year 2059, to continually update information regarding absence or future presence/distribution of the species, should they become established. If SNYLF are found within or near sites that are affected by UARP operations, then additional consultation with appropriate agencies would occur.

The Project will have no effect on SNYLF. There are no SNYLF detections within Project boundary from surveys during years 2003, 2015, and 2017. Project reservoirs within the FERC license boundary are unsuitable for SNYLF because they contain predatory fish. Were SNYLF to occur in the Project area, there is negligible risk for direct effects on SNYLF due to direct or indirect exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios for chemicals to be used at Project facilities near water (Tables 9 and 10). The single herbicide with a high hazard quotient and the most toxic properties for aquatic resources (Triclopyr BEE) will only be used in limited basal applications and will not be used within 300 feet of manmade or natural watercourses. Furthermore, vegetation treatments as Project facilities above 4,500 ft and near water are typically being implemented to maintain bare ground conditions near man-made structures that provide no or marginally suitable existing habitat conditions. No herbicide spraying will occur in the inlets to reservoirs, which are expected to be the most suitable for SNYLF, based on where the species is found in the nearby Desolation Wilderness Area. In addition, Resource Protection Measures for the Project provide additional assurances against any potential adverse effects (e.g., implementing herbicide exclusion buffers [Table 11], using ground-based application equipment, applying herbicide during favorable weather conditions, restricting applications during inclement weather or high winds, using low-pressure spray nozzles that produce large droplets, restricting application to the lowest 24 inches of vegetation, using spray guards when necessary, having a spill contingency plan, monitoring for sensitive amphibians, and water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures).

Loon Lake Reservoir and all aquatic features surrounding Loon Lake, as well as all aquatic features surrounding Buck Island Lake, Rubicon Reservoir, and Rockbound Lake (Rockbound Lake is near but outside of the Project) are located within USFWS Critical Habitat for SNYLF (USFWS 2016). The Primary Constituent Elements (PCEs) of Critical Habitat for SNYLF are: 1) aquatic habitat for breeding and rearing; 2) aquatic nonbreeding habitat, and 3) upland habitat (USFWS 2016). The Project would have no effect on USFWS designated Critical Habitat because no herbicides will be applied to aquatic habitat (potential breeding, rearing, and overwintering), and within upland areas, herbicide application would be restricted to developed sites that do not provide suitable habitat for SNYLF. No herbicide use will occur in the Desolation Wilderness Management Area, which represents a substantial amount of Critical Habitat within and near the Project. Application buffers and other design criteria would avoid indirect impacts to PCEs from herbicide (i.e. from herbicide drift, runoff, or leaching).

The Project may affect but is not likely to adversely affect FYLF. Effects on FYLF from the direct application of herbicides to watercourses (namely, Silver Creek and the SF American River, where FYLF are known to occur) are improbable under the Project because, as described in the VIWMP and listed in Table 11, herbicide exclusion buffers will be implemented for all watercourses. No application will occur within these buffers, and no herbicide batching (i.e., mixing and loading) will be allowed within 300 feet of any manmade or natural watercourse. Furthermore, any slight amounts of herbicides that may incidentally enter streams via runoff or leaching would be diluted and flushed downstream, particularly in the relatively high-discharge system of the South Fork American River. The manmade water conveyance and storage structures are managed to be devoid of vegetation. Prior to work on either manmade or natural watercourses, workers will be educated on sensitive frog identification to minimize the chance of herbicides being introduced to watercourse from contact with clothes/boots or from backpack sprayers. Buffers and other Resource Protection Measures (listed above) would mitigate against any significant effects on FYLF from herbicide drift, runoff, or leaching.

4.6 Western Pond Turtle

Tables 12 and 13 provide hazard quotients for acute and chronic exposure scenarios for reptiles.

Table 12. Hazard Quotients for Acute Exposure Scenarios for reptiles: western pond turtle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.004	14	0.0002	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.004	1,686	0.000003	No
Clopyralid	Consumption of contaminated	0.005	670	0.000007	No

	fish; fish-eating bird				
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.035	1,500	0.00002	No
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.014	2,510	0.000005	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.017	312	0.00005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0000003	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0004	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	0.00007	116	0.0000006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 13. Hazard Quotients for Chronic Exposure Scenarios for reptiles: western pond turtle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.0002	184	0.000001	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.000004	140	0.00000003	No
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.00005	15	0.000003	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.00001	58	0.0000002	No
Imazapyr	Consumption of contaminated fish; fish-eating	0.00006	610	0.00000009	No

	bird				
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.000001	2	0.0000005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.0000002	7.5	0.00000002	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.00008	7.5	0.00001	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

The risk for direct effects on western pond turtle (there is insufficient data available for a reptile risk assessment so fish-eating birds are used a surrogate) residing along the SF American River due to direct or indirect exposure to herbicides based on the derived hazard quotients for acute and chronic exposure scenarios is negligible for each Project herbicide. In addition, Resource Protection Measures for the Project (e.g., annual employee education and awareness training, a spill contingency plan, using ground-based application equipment, applying herbicide during favorable weather conditions, using low-pressure spray nozzles that produce large droplets, etc.) would further minimize the risk of herbicides to enter the South Fork American River in concentrations that could affect western pond turtle. SMUD will also implement water quality monitoring adjacent to treated areas to document the effectiveness of proposed buffers and Resource Protection Measures. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for western pond turtle.

4.7 Bald Eagle

Tables 14 and 15 provide hazard quotients for acute and chronic exposure scenarios for bald eagle.

Table 14. Hazard Quotients for Acute Exposure Scenarios for fish-eating birds: Bald Eagle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.004	14	0.0002	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating	0.004	1,686	0.000003	No

	bird				
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.005	670	0.000007	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating bird	0.035	1,500	0.00002	No
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.014	2,510	0.000005	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.017	312	0.00005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0000003	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.056	126	0.0004	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	0.00007	116	0.0000006	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 15. Hazard Quotients for Chronic Exposure Scenarios for fish-eating birds: Bald Eagle[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of contaminated fish; fish-eating bird	0.0002	184	0.000001	No
Chlorsulfuron	Consumption of contaminated fish; fish-eating bird	0.000004	140	0.00000003	No
Clopyralid	Consumption of contaminated fish; fish-eating bird	0.00005	15	0.000003	No
Glyphosate (less toxic formulations)	Consumption of contaminated fish; fish-eating	0.00001	58	0.0000002	No

	bird				
Imazapyr	Consumption of contaminated fish; fish-eating bird	0.00006	610	0.00000009	No
Sulfometuron methyl	Consumption of contaminated fish; fish-eating bird	0.000001	2	0.0000005	No
Triclopyr (BEE)	Consumption of contaminated fish; fish-eating bird	0.0000002	7.5	0.00000002	No
Triclopyr (TEA)	Consumption of contaminated fish; fish-eating bird	0.00008	7.5	0.00001	No
Triclopyr (TCP)	Consumption of contaminated fish; fish-eating bird	NA	NA	NA	NA

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
NA= Data is Not Available

Indirect effects on bald eagle could occur if they were to consume contaminated fish. However, the risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for bald eagle. Therefore, adverse effects on foraging or wintering bald eagle as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely.

Indirect effects on bald eagle could also occur if nesting habitat was removed or altered, or if nesting birds were disturbed by human activity (e.g., noise from chainsaws or trimmers during mechanical vegetation removal). Hazard tree removal includes the removal of trees that are a hazard to people, property or facilities (e.g., a tree that could fall and cause an outage). Bald eagle monitoring is required annually under SMUD's Bald Eagle Monitoring Plan (SMUD 2015). These surveys would identify active nest trees, eliminating any chance of inadvertent removal and the subsequent loss of eggs or nestlings. If a nest is located within 0.25-miles of mechanical vegetation treatments that may potentially indirectly disturb nesting bald eagles during the breeding season, a no-disturbance buffer will be established in accordance with National Bald Eagle Management Guidelines (USFWS 2007) to minimize visual and auditory impacts associated with human activities. The size and shape of the buffer would vary depending on the topography and other ecological characteristics surrounding the nest site. As a result, direct effects on nesting bald eagle populations in the Project vicinity are unlikely. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for bald eagle.

4.8 Northern Goshawk and California Spotted Owl

Table 16 provides hazard quotients for acute (non-accidental) exposure scenarios for northern goshawk and California spotted owl. There is no data for a chronic exposure scenarios since a situation where meat eating birds would consume accidently treated mammals on a consistent and regular basis is not likely.

Table 16. Hazard Quotients for Acute (Non-Accidental) Exposure Scenarios for meat-eating birds: northern goshawk and California spotted owl[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Consumption of small mammal (after direct spray); carnivorous birds	0.355	14	0.03	No
Chlorsulfuron	Consumption of small mammal (after direct spray); carnivorous birds	0.155	1,686	0.00009	No
Clopyralid	Consumption of small mammal (after direct spray); carnivorous birds	0.452	670	0.0007	No
Glyphosate (less toxic formulations)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	1,500	0.004	No
Imazapyr	Consumption of small mammal (after direct spray); carnivorous birds	1.07	2,510	0.0004	No
Sulfometuron methyl	Consumption of small mammal (after direct spray); carnivorous birds	0.425	312	0.001	No
Triclopyr (BEE)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	126	0.05	No
Triclopyr (TEA)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	126	0.05	No
Triclopyr (TCP)	Consumption of small mammal (after direct spray); carnivorous birds	6.46	116	0.06	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.

[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.NA= Data is Not Available

The risk characterization for the Project herbicides does not exceed the level of concern for any exposure scenarios likely for northern goshawk or California spotted owls. Therefore, adverse effects to northern goshawk or spotted owls as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely.

Other potential Project-related impacts could result from noise-generating activities, such as chainsaw or trimmer operations in the vicinity of active nests. Impacts could also result from hazard tree removal at or near a nest site. Such disturbance during the nesting season can result in nest site failure or abandonment. Resource Protection Measures include confirming the location of nests or activity centers, establishing no-disturbance buffer zones around the nest site or activity center during the breeding season, or postponing construction until after the end of the nesting season (15 February through 15 September for northern goshawk, and 1 March through 15 August for California spotted owl) or after the nestlings have fledged. With implementation of these Resource Protection Measures, nesting northern goshawks or California spotted owl would have little or no awareness of Project activities. The potential for direct effects on California spotted owl is further reduced since the owl is mostly nocturnal and Project activities will be during the day.

The Project may affect individuals, but is not likely to result in a trend toward federal listing for northern goshawk or California spotted owl.

4.9 Townsend's Big-Eared Bat, Pallid Bat, and Fringed Myotis

Table 17 provides hazard quotients for acute (non-accidental) exposure scenarios for special-status bat species with potential to occur in the Project Area.

Table 17. Hazard Quotients for Acute (Non-Accidental) Exposure Scenarios for small mammals: bats (Townsend's Big-Eared Bat, Pallid Bat, and Fringed Myotis)[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Small mammal, contaminated insects	2.12	104	0.02	No
Chlorsulfuron	Small mammal, contaminated insects	0.925	75	0.01	No
Clopyralid	Small mammal, contaminated insects	0.452	75	0.04	No
Glyphosate (less toxic formulations)	Small mammal, contaminated insects	38.5	500	0.08	No
Imazapyr	Small mammal, contaminated insects	6.36	738	0.009	No
Sulfometuron methyl	Small mammal, contaminated insects	2.7	312	0.02	No

Triclopyr (BEE)	Small mammal, contaminated insects	38.5	440	0.09	No
Triclopyr (TEA)	Small mammal, contaminated insects	38.5	440	0.09	No
Triclopyr (TCP)	Small mammal, contaminated insects	5.48	25	0.2	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on bats could occur if they were to consume contaminated insects, or if their insect prey base was reduced as a result of reduction in available habitat. The risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for bats. Therefore, adverse effects on FSS bat species as a result of the application of these chemicals at the maximum application rates described in the VIWMP is very unlikely. The effect to prey habitat would be negligible, since treatment of vegetation would be restricted to areas surrounding facilities, along transmission ROWs, and along roadside shoulders and trails; habitat for bat prey species, primarily arthropods (including but not limited to butterflies, moths, beetles, spiders, etc.) is abundant in the Project area and would not be affected by maintenance of these areas.

Direct effects on bats could occur if hazard trees that provide bat roosting habitat were removed. Bats may also be indirectly affected by noise from equipment such as chainsaws or trimmers. Bat life history stages with the most sensitivity to disturbance are winter hibernation and breeding/rearing offspring. While Townsend's big-eared bat, pallid bat, and fringed myotis may use large tree cavities for day or night roosts, these species will typically use caves, tunnels, mines, and/or buildings for winter hibernacula or maternity colonies. Therefore, hazard tree removal will not likely affect bats during these sensitive time periods. Any bats potentially using hazard trees as day or night roosts would be able to leave the area unharmed during tree removal activities. The Project Area has a great deal of snags and fractured rock walls that would be suitable for roosting bats that may be displaced by the Project. Noise disturbance from equipment is expected to occur in areas where there is already an existing level of background human presence and disturbance, and is furthermore expected to be of very short intensity and duration.

The Project may affect individuals, but is not likely to result in a trend toward federal listing for Townsend's big-eared bat, pallid bat, or fringed myotis.

4.10 Sierra Nevada Red Fox

Tables 18–20 provide hazard quotients for acute (accidental), chronic, and acute (non-accidental) exposure scenarios for Sierra Nevada red fox.

Table 18. Hazard Quotients for Acute (Accidental) Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Canid, contaminated water	0.005	104	0.00005	No
	Canid, contaminated fish[4]	0.003	104	0.00002	No
Chlorsulfuron	Canid, contaminated water	0.003	75	0.00004	No
	Canid, contaminated fish[4]	0.004	75	0.00005	No
Clopyralid	Canid, contaminated water	0.008	75	0.0001	No
	Canid, contaminated fish[4]	0.004	75	0.00005	No
Glyphosate (less toxic formulations)	Canid, contaminated water	0.115	500	0.0002	No
	Canid, contaminated fish[4]	0.030	500	0.00006	No
Imazapyr	Canid, contaminated water	0.047	250	0.0002	No
	Canid, contaminated fish[4]	0.012	250	0.00005	No
Sulfometuron methyl	Canid, contaminated water	0.008	87	0.00009	No
	Canid, contaminated fish[4]	0.014	87	0.0002	No
Triclopyr (BEE)	Canid, contaminated water	0.115	20	0.006	No
	Canid, contaminated fish[4]	0.048	20	0.002	No
Triclopyr (TEA)	Canid, contaminated water	0.115	20	0.006	No
	Canid, contaminated fish[4]	0.048	20	0.002	No
Triclopyr (TCP)	Canid,	0.0005	25	0.00002	No

	contaminated water				
	Canid, contaminated fish[4]	0.0002	25	0.000008	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
[4] Contaminated fish are used as a conservative surrogate for contaminated small mammals (primary prey species for fox), which were not available as an option in this exposure scenario

Table 19. Hazard Quotients for Chronic Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Canid, contaminated water	0.0004	50	0.000007	No
	Canid, contaminated fish[4]	0.0002	50	0.000004	No
Chlorsulfuron	Canid, contaminated water	0.000002	5	0.0000005	No
	Canid, contaminated fish[4]	0.000003	5	0.0000006	No
Clopyralid	Canid, contaminated water	0.00008	15	0.000006	No
	Canid, contaminated fish[4]	0.00004	15	0.000003	No
Glyphosate (less toxic formulations)	Canid, contaminated water	0.00003	500	0.00000006	No
	Canid, contaminated fish[4]	0.000008	500	0.00000002	No
Imazapyr	Canid, contaminated water	0.0002	250	0.0000008	No
	Canid, contaminated fish[4]	0.00005	250	0.0000002	No
Sulfometuron methyl	Canid, contaminated water	0.0000005	2	0.0000002	No
	Canid, contaminated fish[4]	0.0000008	2	0.0000004	No
Triclopyr (BEE)	Canid,	0.0000003	1	0.0000003	No

	contaminated water				
	Canid, contaminated fish[4]	0.0000001	1	0.0000001	No
Triclopyr (TEA)	Canid, contaminated water	0.0002	1	0.0002	No
	Canid, contaminated fish[4]	0.00007	1	0.00007	No
Triclopyr (TCP)	Canid, contaminated water	0.000008	12	0.0000007	No
	Canid, contaminated fish[4]	0.000004	12	0.0000003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.
[4] Contaminated fish are used as a conservative surrogate for contaminated small mammals (primary prey species for fox), which were not available as an option in this exposure scenario

Table 20. Hazard Quotients for Acute (Non-accidental) Exposure Scenarios for canids: Sierra Nevada Red Fox[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Small mammal; direct spray	0.299	104	0.003	No
	Contaminated fish; overspray	0.0005	104	0.000005	No
Chlorsulfuron	Small mammal; direct spray	0.130	75	0.002	No
	Contaminated fish; overspray	0.0005	75	0.000007	No
Clopyralid	Small mammal; direct spray	0.380	75	0.005	No
	Contaminated fish; overspray	0.000	75	0.000002	No
Glyphosate (less toxic formulations)	Small mammal; direct spray	5.43	500	0.01	No
	Contaminated fish; overspray	0.0005	500	0.000001	No
Imazapyr	Small mammal; direct spray	0.896	250	0.004	No
	Contaminated fish; overspray	0.0001	250	0.0000006	No
Sulfometuron methyl	Small mammal; direct spray	0.380	87	0.004	No
	Contaminated fish; overspray	0.00002	87	0.0000002	No

Triclopyr (BEE)	Small mammal; direct spray	5.43	20	0.3	No
	Contaminated fish; overspray	0.00003	20	0.000001	No
Triclopyr (TEA)	Small mammal; direct spray	5.43	20	0.3	No
	Contaminated fish; overspray	0.0002	20	0.00001	No
Triclopyr (TCP)	Small mammal; direct spray	5.43	25	0.2	No
	Contaminated fish; overspray	0.00007	25	0.000003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on Sierra Nevada fox could occur if they were to consume contaminated prey items (e.g., small mammals) or drink contaminated water. However, the risk assessment for Project herbicides does not exceed the level of concern for any of the exposure scenarios likely for canids. Furthermore, no resident populations of Sierra Nevada red fox are known to be present in the Project Are or Eldorado National Forest. Therefore, the Project will have no effect on Sierra Nevada red fox.

4.11 Pacific Marten

Tables 21 and 22 provide hazard quotients for acute (accidental) and chronic exposure scenarios for Pacific marten.

Table 21. Hazard Quotients for Acute (Accidental) Exposure Scenarios for larger mammals: Pacific marten[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Larger mammal, contaminated water	0.007	104	0.00006	No
Chlorsulfuron	Larger mammal, contaminated water	0.004	75	0.00005	No
Clopyralid	Larger mammal, contaminated water	0.010	75	0.0001	No
Glyphosate (less toxic formulations)	Larger mammal, contaminated water	0.115	500	0.0003	No
Imazapyr	Larger mammal,	0.060	738	0.00008	No

	contaminated water				
Sulfometuron methyl	Larger mammal, contaminated water	0.010	87	0.0001	No
Triclopyr (BEE)	Larger mammal, contaminated water	0.148	100	0.001	No
Triclopyr (TEA)	Larger mammal, contaminated water	0.148	100	0.001	No
Triclopyr (TCP)	Larger mammal, contaminated water	0.0006	25	0.00003	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Table 22. Hazard Quotients for Chronic Exposure Scenarios for larger mammals: Pacific marten[1]

Chemical Name	Exposure[2] Scenario	Exposure[2] Estimate mg/kg	Toxicity Value mg/kg	Hazard Quotient[3]	Exceeds Level of Concern?
Aminopyralid	Larger mammal, contaminated water	0.0005	50	0.00001	No
Chlorsulfuron	Larger mammal, contaminated water	0.000003	5	0.0000004	No
Clopyralid	Larger mammal, contaminated water	0.0001	15	0.000007	No
Glyphosate (less toxic formulations)	Larger mammal, contaminated water	0.00004	500	0.00000008	No
Imazapyr	Larger mammal, contaminated water	0.0003	738	0.0000005	No
Sulfometuron methyl	Larger mammal, contaminated water	0.0000006	2	0.0000003	No
Triclopyr (BEE)	Larger mammal, contaminated	0.0002	5	0.00004	No

	water				
Triclopyr (TEA)	Larger mammal, contaminated water	0.0000004	5	0.00000009	No
Triclopyr (TCP)	Larger mammal, contaminated water	0.00001	12	0.0000009	No

[1]Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[2]Exposure: The process of estimating the extent to which a population will come into contact with a chemical or biological agent. This is measured as mg/kg/day or mg/kg/event. In all cases, the central limit was used for the analysis.
[3]Hazard Quotient Rating: The ratio of the estimated level of exposure to the RfD (toxicity value) (or some other index of acceptable exposure). This value is used to measure risk; values above 1 mean there is a potential risk to the species by use of the chemicals at the given rate for the given scenario.

Indirect effects on Pacific marten could occur if they were to consume contaminated prey items or drink contaminated water. The risk assessment for Project herbicides does not exceed the level of concern for the contaminated water exposure scenarios for larger mammals (data were not available for small mammal or fish prey).

Direct effects on Pacific marten could occur if hazard trees that provide natal dens were removed. Pacific martens typically den in late-successional conifer forest with moderate-to-high canopy closure; these habitat characteristics are not typically associated with transmission right-of-ways, along roads and trails, or near hydroelectric facilities, where hazard tree abatement will typically occur. Therefore, hazard tree removal will not likely affect Pacific marten during denning, which is the most sensitive time where martens are relatively inactive and could be adversely affected. Any marten potentially using hazard trees as resting sites would be able to leave the area unharmed during tree removal activities. The Project Area has resting structures that would be suitable for resting martens that may be displaced by the Project. Therefore, the Project may affect individuals, but is not likely to result in a trend toward federal listing for Pacific marten.

5 DETERMINATION OF EFFECTS

The VIWMP is not likely to result in a trend toward federal listing or loss of viability for Forest Service sensitive species identified for the Project. Effects determinations for each species are below.

5.1 Federally Listed Species

There will be no effect on the following federally listed species as a result of the Project:
- Valley elderberry longhorn beetle
- Sierra Nevada yellow-legged frog and designated Critical Habitat

5.2 Forest Service Sensitive Species

There will be no effect on the following Forest Service Sensitive species as a result of the Project:
- Sierra Nevada yellow-legged frog
- willow flycatcher

- Sierra Nevada red fox

The Project may affect individuals, but is not likely to result in a trend toward federal listing for the following Forest Service Sensitive species:

- western bumble bee
- hardhead
- foothill yellow-legged frog
- western pond turtle
- bald eagle
- northern goshawk
- California spotted owl
- Townsend's big-eared bat
- pallid bat
- fringed myotis
- Pacific marten

This document meets the requirements of FSM 2670, Preparation of Biological Evaluations for Threatened, Endangered and Sensitive Species; further biological evaluation is not required.

PREPARED BY: Holly Burger, Wildlife Biologist, Stillwater Sciences
DATE: 9 October 2017

REVIEWED BY: ____
DATE: ______________

6 LITERATURE CITED

AmphibiaWeb: Information on amphibian biology and conservation [web application]. 2017. Berkeley, California: AmphibiaWeb. Available: http://amphibiaweb.org/. (Accessed: February 2017).

Ashton, D.T., A.J. Lind, and K. E. Schlick. 1998. Foothill yellow-legged frog (*Rana boylii*) natural history. USFS, Pacific Southwest Research Station, Arcata, California.

Baldwin, B.G., D.H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti, and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

Barr, C.B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service, Sacramento, California.

Barbour, R.W., and W.H. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.

Caltrans (California Department of Transportation). 2003. Storm Water Quality Handbooks. Construction Site Best Management Practices (BMPs) Manual.

CDFG (California Department of Fish and Game). 2009. Bald eagles in California. Nongame Wildlife Program, California Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/bald_eagle/ [Accessed June 2015].

CDFW (California Department of Fish and Wildlife). 2013. Evaluation of the petition to list the Townsend's big-eared bat (*Cornynorhinus townsendii*) as threatened or endangered. Prepared by CDFW, Sacramento, California.

CDFW. 2015. Bald eagles in California. Website. http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/bald_eagle/ [Accessed 12 June 2015]. Prepared by CDFW, Sacramento, California.

CDFW. 2017. California Natural Diversity Database. California Natural Diversity Database. RareFind3. Electronic database. Natural Heritage Division, California Department of Fish and Game, Sacramento, California. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data [Accessed February 2017].

Call, M.W. 1978. Nesting habits and survey techniques for common western raptors. Technical Note No. 316. U.S. Bureau of Land Management, Portland, Oregon.

Craig, D. and P.L. Williams. 1998. Willow Flycatcher (*Empidonax traillii*). *In* The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/plans.html.

DTA (Devine Tarbell & Associates, Inc.) 2004a. Valley elderberry longhorn beetle technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004b. Northern goshawk technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004c. California spotted owl technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004d. Willow Flycatcher nesting habitat technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004e. Bats technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA. 2004f. Mesocarnivores technical report. Prepared by DTA, Sacramento, California for Sacramento Municipal Utility District, Sacramento, California.

DTA and Santa Cruz Predatory Bird Research Group. 2004. Bald eagle and osprey technical report. Prepared by DTA, Sacramento, California and Santa Cruz Predatory Bird Research Group, Santa Cruz, California for Sacramento Municipal Utility District, Sacramento, California.

DTA and Stillwater Sciences. 2005a. Reservoir fisheries technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

DTA and Stillwater Sciences. 2005b. Stream fisheries technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

DTA and Stillwater Sciences. 2005c. Amphibians and aquatic reptiles technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

Duellman, W.E., and L. Trueb. 1986. Biology of Amphibians. McGraw-Hill Book Co., New York.

FERC (Federal Energy Regulatory Commission). 2014. Order Issuing New License for the continued operation of the Upper American River Project, FERC Project No. 2101, Washington, D.C.

Gutiérrez, R.J., A.B. Franklin, and W. S. Lahaye. 1995. Spotted owl (*Strix occidentalis*). *In* A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/179/articles/introduction [Accessed September 2010].

Haley, D. 1975. Sleek and savage: North America's weasel family. Pacific Search Books, Seattle, WA. 128pp.

Hatfield, R.G. and G. LeBuhn. 2007. Patch and landscape factors shape community assemblage of bumble bees, *Bombus* spp. (Hymenoptera: Apidae) in montane meadows. Biological
Conservation 139:150–158.

Hermanson, J.W., and T.J. O'Shea. 1983. *Antrozous pallidus*. Mammalian Species 213: 1–8.

Herren, V., and B. Luce. 1997. Black Hills Bat Project: final report for 1997. Prepared by South Dakota Department of Game, Fish and Parks, Pierre, South Dakota.

Holland, D.C. 1994. The western pond turtle: habitat and history. Final Report. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report. Prepared for California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California.

Keane, J. 2008. Northern goshawk (*Accipter gentilis*). Pages 156–162 *in* W. D. Shuford and T. Gardali, editors. California bird species of special concern: a ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Studies of western birds no. 1. Western Field Ornithologists, Camarilla, California and California Department of Fish and Game, Sacramento, California.

Keinath, D. A. 2003. Species assessment for fringed myotis (*Myotis thysanodes*) in Wyoming. Prepared by University of Wyoming, Laramie for U.S. Bureau of Land Management, Wyoming State Office, Cheyenne.

Kucera, T.E., W.J. Zielinski, and R.H. Barrett. 1995. Current Distribution of the American marten, *Martes americana*, in California. Calif. Fish and Game 81 (3):96-103 1995.

Kupferberg, S.J. 1996. Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (*Rana boylii*). Ecological Applications 6: 1,332–1,344.

Lacki, M.J. and M. D. Baker. 2007. Day roosts of female fringed myotis (*Myotis thysanodes*) in xeric forests of the Pacific Northwest. Journal of Mammalogy 88: 967–973.

Lewis, S.E. 1994. Night roosting ecology of pallid bats (*Antrozous pallidus*) in Oregon. American Midland Naturalist 132: 219–226.

Martin, S.K. 1987. The ecology of the pine marten (*Martes americana*) at Sagehen Creek, California. Ph.D. Dissertation, University of California, Berkeley.

Matthews, K.R. and K.L. Pope. 1999. A telemetric study of the movement patterns and habitat use of *Rana muscosa*, the mountain yellow-legged frog, in a high-elevation basin in Kings Canyon National Park, California. Journal of Herpetology. 33:615-623.

NatureServe Explorer. 2015. Fringed myotis. Online: http://explorer.natureserve.org/servlet/NatureServe?searchName=Myotis+thysanodes

Perrine, J.D. 2005. Ecology of red fox (*Vulpes vulpes*) in the Lassen Peak Region of California, USA. Dissertation, University of California, Berkeley, California, USA.

Pesticide Research Institute. 2010. Marin Municipal Water District Herbicide Risk Assessment Draft Final January 1, 2010.

Philpott, W. 1997. Summaries of the life histories of California bat species. White paper. Pineridge Ranger District, Sierra National Forest. Prather, California.

Pierson, E.D. and G. M. Fellers. 1998. Distribution and ecology of the big-eared bat, *Corynorhinus townsendii* in California. Prepared for U.S. Geological Service, Species at Risk Program.

Pierson, E.D. and W. E. Rainey. 1996. The distribution, status and management of Townsend's big-eared bat (*Corynorhinus townsendii*) in California. Bird and Mammal Conservation Program Report 96-7. Prepared for California Department of Fish and Game.

Pierson, E.D. and W. E. Rainey. 2007. Bat Distribution in the forested region of northwestern California. Prepared for California Department of Fish and Game, Sacramento, California.

Pierson, E.D., W. E. Rainey, and R. M. Miller. 1996. Night roost sampling: a window on the forest bat community in northern California. Pages 151–163 *in* R. M. R. Barclay and R. M. Brigham, editors. Bats and Forests Symposium, 19–21 October 1995. Victoria, British Columbia, Canada. Working Paper 23/1996. Research Branch, B.C. Ministry of Forests, Victoria, British Columbia.

Pierson, E.D., W. E. Rainey, and C. Corben. 2001. Seasonal patterns of bat distribution along an altitudinal gradient in the Sierra Nevada. Prepared for California Department of Transportation, California State University at Sacramento Foundation, Yosemite Association, and Yosemite Fund.

Sedgwick, J.A. 2000. Willow flycatcher (*Empidonax traillii*). In A. Poole, editor. The Birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/533/articles/introduction.

SERA (Syracuse Environmental Research Associates, Inc.). 2007. Aminopyralid - Human Health and Ecological Risk Assessment Worksheets. TR-052-04-04a.

SERA. 2014. Preparation of Environmental Documentation and Risk Assessments for the USDA/Forest Service. November 17, 2014.

Sherwin, R., and D.A. Rambaldini. 2005. *Antrozous pallidus* pallid bat. Species account developed for the Western Bat Working Group 1998 Reno Biennial Meeting; updated for the 2005 Portland Biennial Meeting.

Sherwin, R., and A. Piaggio. 2005. *Corynorhinus townsendii* Townsend's big-eared bat. Species account developed for the Western Bat Working Group 1998 Reno Biennial Meeting; updated for the 2005 Portland Biennial Meeting. Western Bat Working Group, Rapid City, South Dakota. http://wbwg.org/species_accounts/vespertilonidae/coto.pdf [Accessed July 2010].

Sherwin, R.E., D. Stricklan and D. S. Rogers. 2000. Roosting affinities of Townsend's big-eared bat (*Corynorhinus townsendii*) in northern Utah. Journal of Mammalogy 81: 939–947.

SMUD (Sacramento Municipal Utility District). 2004. Upper American River Project–Mesocarnivore technical report. Prepared by Devine Tarbell and Associates, Inc. FERC Project No. 2101.

SMUD. 2008. Upper American River Project (FERC No. 2101), Mitigation Monitoring Program including Construction and Operation of the Iowa Hill Pumped-Storage Development. April.

SMUD. 2016. Bald Eagle Monitoring Report. Prepared by Stillwater Sciences. FERC Project No. 2101. November 2016.

SMUD. 2017. Amphibian and Aquatic Reptile Monitoring Report. Prepared by Stillwater Sciences. FERC Project No. 2101. June 2017.

Spencer, W.D., R.H. Barrett, and W.J. Zielinski. 1983. Marten habitat preferences in the northern Sierra Nevada. Journal of Wildlife Management 47(4):1181-1186.

Spencer, W.D. 1987. Seasonal rest-site preferences of pine martens in the northern Sierra Nevada. Journal of Wildlife Management 51(3):616-621.

Squires, J.R. and R. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). *In* A Poole, editor. The birds of North America Online. Cornell Lab of Ornithology, Ithaca, New York. http://bna.birds.cornell.edu/bna/species/298.

Stone, K. 2010. *Martes americana*, American marten. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/animals/mammal/maam/-all.html [2017, March 17].

SWRCB (State Water Resources Control Board). 2013a. Water Quality Certification for the Upper American River Project. Prepared by the State Water Resources Control Board.

SWRCB. 2013b. Water Quality Certification for the Upper American River Project, Attachment A – California Environmental Quality Act Findings and Mitigation Monitoring and Reporting Plan. Prepared by the State Water Resources Control Board.

Stebbins, R.C. 2003. A field guide to western reptiles and amphibians. Third edition. Houghton Mifflin Company, Boston-New York.

Stillwater Sciences. 2008. Technical Report on the 2007 Slab Creek Dam Reach Fish Distribution Study. Davis, CA. Unpublished Report.

Stillwater Sciences. 2015. Results of Sierra Nevada Yellow-legged Frog Pre-construction Surveys at Buck Island Weir Reconstruction and Rubicon Outlet Modification Project Sites.

Stillwater Sciences. 2017. Results of 2017 Supplemental Sierra Nevada Yellow-legged Frog Surveys at Select UARP Project Sites.

Williams, P.H., R.W. Thorp, L. L. Richardson, and S. R. Colla, S.R. 2014. The bumble bees of North America: an identification guide. Princeton University Press, Princeton.

USFS (United States Forest Service). 1989. Eldorado National Forest Regional Land and Resource Management Plan. USDA Forest Service, Pacific Southwest Region.

USFS. 2004. Sierra Nevada Forest Plan Amendment: Final Environmental Impact Statement Volumes 1-6 and Record of Decision. Pacific Southwest Region, San Francisco, CA. January 2001 and revised 2004.

USFS. 2012. Updated Activity Center and Protected Activity Center geospatial (shapefile) data for Northern Goshawk, and updated Activity Center, Protected Activity Center, and Home Range Core Area Data for California Spotted Owl.

USFS. 2014. USFS Species Fact Sheet for *Bombus occidentalis*, western bumble bee. Found at https://www.fs.fed.us/r6/sfpnw/issssp/documents3/sfs-iihy-bombus-occidentalis-2014-02.doc

USFWS (U. S. Fish and Wildlife Service). 1997. Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter and Yolo Counties, California. Letter from USFWS to USACE on November 13, 1997.

USFWS. 1998. Northern goshawk finding. Prepared by USFWS, Portland, Oregon.

USFWS. 1999. Conservation guidelines for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Sacramento, California.

USFWS. 2007. National bald eagle management guidelines.

USFWS. 2009. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project No. 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

USFWS. 2013. USFWS online database of USFWS and National Marine Fisheries Service (NMFS) Critical Habitat designations.

USFWS. 2014. Endangered and threatened wildlife and plants; endangered species status for Sierra Nevada yellow-legged frog and northern distinct population segment of the mountain yellow-legged frog, and threatened species status for Yosemite toad. Federal Register 79: 24,256–24,310.

USDI Fish and Wildlife Service. 2016. Endangered and threatened wildlife and plants: designation of critical habitat for the Sierra Nevada yellow-legged frog, the Northern DPS of the mountain yellow-legged frog, and the Yosemite toad; final rule. FR 81 (166): 59046-59119.

USFWS. 2017a. Information for Planning and Conservation (IPaC). https://ecos.fws.gov/ipac/ [Accessed January 19, 2017].

USFWS. 2017b. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*). U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

Vredenburg, V.T., G. Fellers, and C. Davidson. 2005. The mountain yellow-legged frog (*Rana muscosa*). In Lannoo, M.J. (Ed.), Status and Conservation of U.S. Amphibians. University of California Press, Berkeley, California, USA.

Vredenburg, V.T., R. Bingham, R.A. Knapp, J.A.T. Morgan, C. Moritz, and D. Wake. 2007. Concordant molecular and phenotypic data delineate new taxonomy and conservation priorities for the endangered Mountain Yellow-legged Frog. Journal of Zoology. Volume (271) 361–374.
WDFW (Washington State Department of Fish and Wildlife). 1994. Priority habitats management recommendations: caves. Unpublished Draft Report. Washington State Department of Fish and Wildlife, Olympia.

WDFW. 2004. Pallid bat (*Antrozous pallidus*). *In* Management recommendations for Washington's priority species, Volume V: mammals. Olympia, Washington.

Wengert, G. 2008. Habitat use, home range, and movements of mountain yellow-legged frogs (Rana muscosa) in Bean and Spanish Creeks on the Plumas National Forest. MGW Biological and Klamath Wildlife Resources, unpublished report.

Weller, T. J. and C. J. Zabel. 2001. Characteristics of fringed myotis day roosts in northern California. Journal of Wildlife Management 65: 489–497.

Western Bat Working Group. 2015. Western bat species. Website. http://wbwg.org/western-bat-species/ [Accessed 10 June 2015]. Prepared by Western Bat Working Group, Rapid City, South Dakota.

Woodbridge, B., and P.J. Detrich. 1994. Territory occupancy and habitat patch size of northern goshawks in the southern Cascades of California. Studies in Avian Biology 16: 83–87.

Zeiner, D.C., W.F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990a. California’s wildlife. Volume II. Birds. California Statewide Habitat Relationships System. California Department of Fish and Game.

Zeiner, D.C., W.F. Laudenslayer Jr., K. E. Mayer, and M. White, editors. 1990b. California's wildlife. Volume III. Mammals. California Statewide Habitat Relationships System. California Department of Fish and Game.

Zielinski, W.J., R.H. Barrett, R.L. Truex, and E. Farmer. 1995. Southern Sierra Nevada fisher and marten study: Progress report III (2 March 1995–31 August 1995). USFS, Pacific Southwest Research Station, Arcata, California.

Zielinski, W.J., R.L. Truex, C.V. Ogan, and K. Busse. 1997. Detection surveys for fishers and American martens in California, 1989-1994: summary and interpretations. Pages 372–392 *in* G. Proulx, H. N. Bryant, and P., M. Woodard, editors. Martes: taxonomy, ecology, techniques, and management. Proceedings of the Second International Martes Symposium, Provincial Museum of Alberta, Edmonton.

Zweifel, R.G. 1955. Ecology, distribution, and systematics of frogs of the Rana boylei group. University of California Publications in Zoology 54: 207–292.

Appendix A

Animal Species Considered in the Biological Evaluation/Assessment for the Vegetation and Invasive Weed Management Plan

Table A-1. Wildlife Species[a] Considered in the Biological Evaluation/Assessment for the Vegetation and Invasive Weed Management Plan.

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Invertebrates					
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	DTA 2004a	FT/–	Streamside habitats throughout the Central Valley	Riparian and oak savanna habitats below 3,000 ft with host plant *Sambucus* sp. (blue elderberry)	None; does not occur in the Project Area since the ENF is located above 1,000 ft and the beetle is found at elevations generally below 500 ft (USFWS 2017)
Western bumble bee *Bombus occidentalis*	CNDDB, USFS list	FSS/–	Northern California	Uses flowering plants in meadows and forested openings; abandoned rodent burrows are used for nest and hibernation sites for queens	Moderate; suitable habitat present
Fish					
Pacific lamprey *Entosphenus tridentatus*	USFS list	FSS/SSC	From Los Angeles to Del Norte counties and the rivers in the Central Valley	Cold, clear water for spawning and incubation; adults use gravel areas to build nests, while ammocoetes need soft sediments in which to burrow during rearing	None; the Project Area is outside of the species' known range
Hardhead *Mylopharadon conocephalus*	USFS list	FSS/SSC	Low- to mid-elevation streams in the Sacramento and San Joaquin river drainages	Clear, deep pools with sand-gravel-boulder bottoms and slow water velocity	High; documented in South Fork American River and Slab Creek Reservoir (DTA and Stillwater Sciences 2005a, 2005b; Stillwater Sciences 2008)
Cui-ui *Chasmistes cujus*	USFWS	FE/–	Pyramid Lake and the lower Truckee River, all within the Pyramid Lake Paiute Reservation in Nevada	Generally found in near shore areas at depths less than 75 feet	None; the Project Area is outside of the species' known range

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Delta smelt *Hypomesus transpacificus*	USFWS	FT/SE	Found only in the Sacramento-San Joaquin Estuary, including the lower reaches of Sacramento and Napa rivers; the Delta including Suisun Bay, Goodyear, Suisun, Cutoff, First Mallard, and Montezuma sloughs	Estuarine or brackish waters up to 18 parts per thousand (ppt); spawn in shallow brackish water upstream of the mixing zone (zone of saltwater-freshwater interface) where salinity is around 2 ppt	None; the Project Area is outside of the species' known range
Steelhead, central California coast DPS *Oncorhynchus mykiss*	USFWS	FT/–	Coastal California streams from the Russian River, south to Aptos Creek, San Francisco, San Pablo, and Suisun bays; the drainages of San Francisco, San Pablo, and Suisun bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin rivers; excludes the Sacramento-San Joaquin Delta	Rivers and streams with cold water, clean gravel of appropriate size for spawning, and suitable rearing habitat; typically rear in fresh water for one or more years before migrating to the ocean	None; the Project Area is outside of the species' known range
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*	CNDDB, USFWS	FT/–	Great Basin watersheds in eastern California; primarily in the Carson, Walker, Truckee, and Susan River drainages	Cold water habitats including large lakes, alpine lakes, slow meandering rivers, mountain rivers, and small tributary streams	None; the Project Area is outside of the species' known range
Amphibians					
Yosemite toad *Anaxyrus canorus*	USFWS, USFS list	FT, FSS/SSC	Found only at high elevations in the Sierra Nevada Mountains, above 4,800 ft	Breeding habitat occurs in lakes, ponds and wetlands	None; no individuals documented during relicensing surveys (DTA and Stillwater Sciences 2005c)
California red-legged frog *Rana draytonii*	CNDDB, USFWS	FT/SSC	Largely restricted to coastal drainages on the central coast from Mendocino County to Baja California; in the Sierra	Breeds in still or slow-moving water with emergent and overhanging vegetation, including wetlands, wet meadows, ponds, lakes, and low-	None; no individuals or habitat documented during relicensing surveys (DTA and

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
			foothills south to Tulare and possibly Kern counties	gradient, slow moving stream reaches with permanent pools; uses adjacent uplands for dispersal and summer retreat	Stillwater Sciences 2005c)
Sierra Nevada yellow-legged frog *Rana sierrae*	CNDDB, USFWS, USFS list	FE, FSS/ST	From Plumas County, south through the Sierra Nevada, to Inyo County	Lakes, ponds, and streams in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats	Very unlikely; no individuals documented during relicensing surveys (DTA and Stillwater Sciences 2005c)
Foothill yellow-legged frog *Rana boylii*	CNDDB, USFS list	FSS/SSC	From the Oregon border along the coast to the Transverse Ranges, and south along the western side of the Sierra Nevada Mountains to Kern County; a possible isolated population in Baja California	Shallow tributaries and mainstems of perennial streams and rivers, typically associated with cobble or boulder substrate	High; documented in the UARP area during relicensing surveys (DTA and Stillwater Sciences 2005c)
Reptiles					
Western pond turtle *Actinemys marmorata*	CNDDB, USFS list	FSS/SSC	From the Oregon border along the coast ranges to the Mexican border, and west of the crest of the Cascades and Sierras	Permanent, slow-moving fresh or brackish water with available basking sites and adjacent open habitats or forest for nesting	High; documented in the UARP area during relicensing surveys (DTA and Stillwater Sciences 2005c)
Birds					
Bald eagle *Haliaeetus leucocephalus*	CNDDB, USFS list	FD, BGEPA, FSS/SE, SFP	Permanent resident and uncommon winter migrant, found nesting primarily in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties	Large bodies of water or rivers with abundant fish, uses adjacent snags or other perches; nests and winter communal roosts in advanced-successional conifer forest within 1.6 km (1 mi) of open water	High; confirmed bald eagle nesting territories at Union Valley and Loon Lake Reservoirs (DTA and Santa Cruz Predatory Bird Research Group 2004a)

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Northern goshawk *Accipter gentilis*	CNDDB, USFS list	FSS/SSC	Nests in North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner Mountains, in Mount Pinos and San Jacinto, San Bernardino, and White Mountains; winters along north coast, throughout foothills, and in northern deserts	Mature and old-growth stands of coniferous forest, middle and higher elevations; nests in dense part of stands near an opening	High; known to nest in the UARP area (DTA 2004e, f)
California spotted owl *Strix occidentalis*	USFS list	FSS/SSC	From the southern Cascade Range of northern California, south along the west slope of the Sierra Nevada, and in mountains of central and southern California nearly to the Mexican border	Typically in older forested habitats; nests in complex stands dominated by conifers, especially coastal redwood, with hardwood understories; some open areas are important for foraging	High; known to nest in the vicinity of the UARP area (DTA 2004b)
Great gray owl *Strix nebulosa*	USFS list	FSS/SE	In the Sierra Nevada from the vicinity of Quincy, Plumas County south to around Yosemite	Dense, coniferous forest, usually near a meadow for foraging; nests in large, broken-topped snags	None; no suitable habitat in the Project Area
Willow flycatcher *Empidonax traillii*	CNDDB, USFS list	FSS/SE	In the Sierra Nevada and Cascade ranges; nests as far south as San Diego County; confirmed breeding along the Eel River, and in mesic clear-cuts in northern Humboldt County	Dense brushy thickets within riparian woodland often dominated by willows and/or alder, near permanent standing water; uses brushy, early-succession forests (e.g., clearcuts) in the Pacific Northwest	Very unlikely; no willow flycatchers detected during relicensing surveys (DTA 2004d); only marginally suitable habitat within Project Area
Mammals					
Townsend's western big-eared bat *Corynorhinus townsendii*	CNDDB, USFS list	FSS/SSC	Throughout California, found in all but subalpine and alpine habitats, details of distribution not well known	Most abundant in mesic habitats; also found in oak woodlands, desert, vegetated drainages, caves or cave-like structures (including basal hollows in large trees, mines, tunnels, and buildings)	Moderate; may roost and forage in Project Area

Common name Scientific name	Query sources	Status[b] Federal/State	Distribution in California	Habitat association	Likelihood to occur in Project Area
Pallid bat *Antrozous pallidus*	CNDDB, USFS list	FSS/SSC	Throughout California except for elevations greater than 10,000 ft in the Sierra Nevada	Roosts in rock crevices, tree hollows, mines, caves, and a variety of vacant and occupied buildings; feeds in a variety of open terrestrial habitats	Moderate; may roost and forage in Project Area
Fringed myotis *Myotis thysanodes*	CNDDB, USFS list	FSS/–	Widespread in California, occurring in all but the Central Valley and Colorado and Mojave Desert	Roosts in crevices in rocks, cliffs, buildings, underground mines, caves, bridges, and in large, decadent trees; most maternal roost sites documented in California have been found in buildings	High; captured in Project Area (DTA 2004c)
Sierra Nevada red fox *Vulpes vulpes necator*	CNDDB	FSS/ST	Cascade Range east to the Sierra Nevada and south to Tulare County; majority of sightings in vicinity of Lassen and Yosemite National Parks	High-elevation (from 5,000 ft to 7,000 ft); conifer forest, sub-alpine woodlands, and barren areas above treeline	Low; limited potential habitat near Project Area (DTA 2004d)
California wolverine *Gulo gulo*	CNDDB, USFS list	FPT, FSS/ST, SFP	Scarce resident of North Coast mountains and Sierra Nevada	Dense mixed-conifer forest in high elevations (between 4,300 ft and 10,800 ft); uses caves, hollows, logs, rock outcrops, and burrows for cover	None; only one confirmed wolverine sighting in California; persistence of this species in the Sierra Nevada is debated (DTA 2004d)
Pacific marten *Martes caurina*	CNDDB, USFS list	FSS/–	Sierra Nevada, Klamath, Cascade mountains, and California north coast regions	High elevation (above 5,500 ft); mature mixed evergreen forests with 40% crown closure, large trees, and snags	High; suitable habitat throughout Project Area, and documented in the Eldorado National Forest (CDFW 2017)
Pacific fisher *Pekania pennanti* West Coast DPS	CNDDB, USFS list	FPT, FSS/SCT, SSC	Two widely separated regions: the northern Coast Range and Klamath Province, and the southern Sierra Nevada	Advanced successional conifer forests, with complex forest structure being more important than tree species; den in hollow trees and snags	None; species considered extirpated/absent or extremely rare from the Central Sierra Nevada

[a] Wildlife species listed in taxonomic order

[b] Status codes:

Federal

FE	= Listed as endangered under the federal Endangered Species Act
FT	= Listed as threatened under the federal Endangered Species Act
FPT	= Federally proposed as threatened
FD	= Federally delisted
FSS	= Forest Service Sensitive species
BGEPA	= Federally protected under the Bald and Golden Eagle Protection Act

State

SE = Listed as Endangered under the California Endangered Species Act
ST = Listed as Threatened under the California Endangered Species Act
SCT = State Candidate Threatened
SSC = State Species of Special Concern
SFP = State Fully Protected species

Appendix G
Biological Evaluation For Botanical Resources

BIOLOGICAL EVALUATION FOR BOTANICAL RESOURCES

SMUD VEGETATION AND INVASIVE WEED MANAGEMENT PLAN FOR THE UPPER AMERICAN RIVER PROJECT (UARP) FERC 2101, ELDORADO NATIONAL FOREST

PROJECT LOCATION:
El Dorado County, California
T11N R11E 24-26
T11N R12E Sections 1, 10-16, 19–22, 28 & 29
T11N R13E Sections 1-8
T11N R14E Sections 1, 2, 6, 7, 12, 18
T11N R15E Sections 5–8
T12N R13E Sections 32–36
T12N R14E Sections 2–4, 8–11, 14–33, 35, 36
T13N R14E Sections 13–15, 22, 23, 26, 27, 34, 35
T13N R15E Sections 2–5, 7–9, 17, 18
T13N R16E Sections 6–9, 16, 17
T14N R15E Sections 33, 34
Mount Diablo Baseline and Meridian (MDB&M).

Prepared By: Nicole Jurjavcic_________ Title: Senior Botanist_____ Date: February 23, 2017

Reviewed By: Matt Brown Title: Botanist, Eldorado National Forest Date: Sept. and Dec., 2017

Approved By: ______________________Title______________________ Date: ___________

SMUD Contact: *Ethan Koenigs* Phone Number: *530-647-5094* Email: *ethan.koenigs@smud.org*

Summary

SMUD's Vegetation and Invasive Weed Management Plan for the Upper American River Project (UARP) (SMUD 2017) is not likely to result in a trend towards federal listing or loss of viability of any of the special-status plant species documented within the Project Area (Table 1).

Table 1. Eldorado National Forest Sensitive species and determination of potential effect by implementation of the VIWMP.

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Vascular			
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium montanum	western goblin	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium pendunculosum	stalked moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	Outside of the Project Area elevation range therefore would not be affected
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	Outside of the Project Area elevation range therefore would not be affected
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	Outside of the Project Area elevation range therefore would not be affected
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Packera layneae	Layne's ragwort	FT/CR/FSS/1B.2	No effect
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Pinus albicaulis	white bark pine	–/–/FSS/–	No effect
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Bryophytes			
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Fungi			
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lichens			
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

[1] Status:
Federal
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare

– No state status

USFS

FSS USFS Sensitive

California Rare Plant Rank (formerly known as CNPS Lists)

1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:

0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

1 INTRODUCTION

1.1 Purpose

The purpose of this botanical Biological Evaluation (BE) is to evaluate potential effects (direct and indirect) to special-status plants, rare natural communities and invasive weeds within Project Area as a result of implementing the VIWMP.

1.2 Project Area

The Project Area addressed by this BE is defined as the UARP FERC boundary limited to USFS lands (Figure 1).

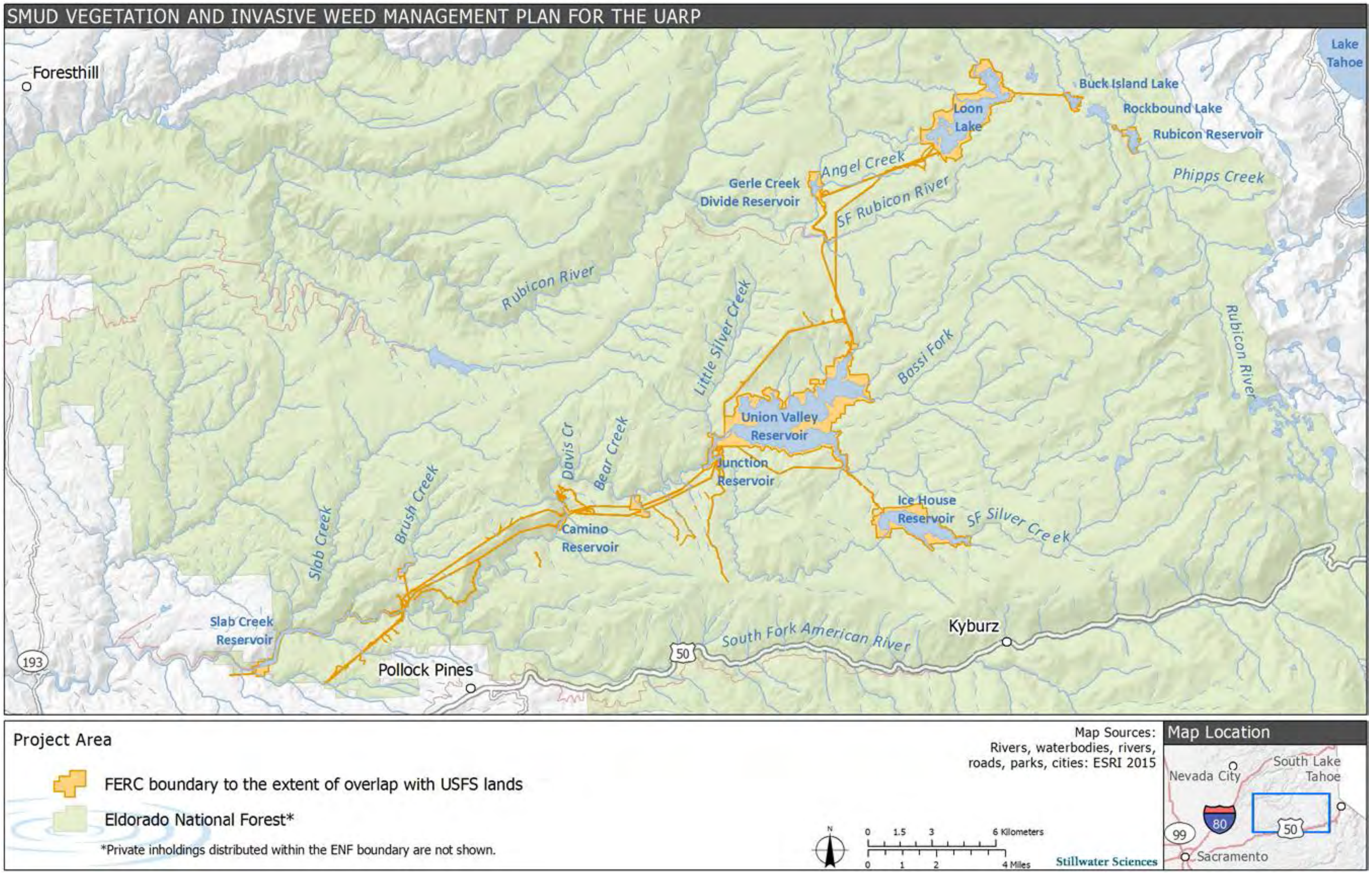


Figure 1. Project Area for the Botanical Biological Evaluation for SMUD's Vegetation and Invasive Weed Management Plan for the UARP.

2 CONSULTATION TO DATE

The Biological Opinion (BO) on the Issuance of a New License for the Upper American River Hydroelectric Project (USFWS 2009) addressed the effects of the proposed action on the endangered *Ceanothus roderickii* (Pine Hill ceanothus), *Fremontodendron decumbens* (Pine Hill flannelbush), and the threatened *Packera layneae (*Layne's butterweed). SMUD will adopt conservation measures related to these species including consultation with BLM, USFWS, and CDFW before conducting transmission line maintenance activities, including IVM, within the Pine Hill Preserve, restriction of treatment to manual methods only (no chemical use) when managing vegetation in the transmission ROW within the preserve, and marking of species' occurrences at the site prior to the onset of activities.

Ceanothus roderickii, *Fremontodendron decumbens*, and *Packera layneae* are located primarily on gabbro-derived soils and are not within the Project Area of this BE; no Threatened, Endangered, or Proposed (TEP) species are known to occur within the Project Area and there is no habitat within the Project Area for these species or *Pinus albicaulis* (whitebark pine; federal candidate). Considering this, no additional formal or informal consultation with the USFWS is necessary.

3 CURRENT MANAGEMENT DIRECTION

The goal of the Forest Sensitive Plant Program is to maintain viable populations of sensitive plant species, and, under Standards and Guidelines for Management Practice 49, "provide for protection and habitat needs of sensitive plants so that Forest activities will not jeopardize the continued existence of such species" (USFS 1989).

Current policy as stated in the USFS Manual (FSM 2670.32) states the following:

1. Assist states in achieving their goals for conservation of endemic species.
2. Review programs and activities as part of the National Environmental Policy Act of 1969 process through a biological evaluation, to determine their potential effect on sensitive species.
3. Avoid or minimize impacts to species whose viability has been identified as a concern.
4. Analyze, if impacts cannot be avoided, the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward federal listing.)
5. Establish management objectives in cooperation with the states when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for federal candidate species, in cooperation with the FWS or NOAA Fisheries and the states.

USFS Manual (FSM) 2900, Invasive Species Management, sets forth National Forest System (NFS) policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (including vertebrates, invertebrates, plants, and pathogens).

The Sierra Nevada Forest Plan Amendment (USFS 2004) provides standards and guidelines for managing noxious weeds. These include but are not limited to:

1. As part of project planning, conduct a noxious weed risk assessment to determine risks for weed spread (high, moderate, or low) associated with different types of proposed management activities. Refer to weed prevention practices in the Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
2. When recommended in project-level noxious weed risk assessments, consider requiring off-road equipment and vehicles (both USFS and contracted) used for project implementation to be weed free.
3. Minimize weed spread by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds.
4. Conduct follow-up inspections of ground disturbing activities to ensure adherence to the Regional Noxious Weed Management Strategy.
5. As outlined in the Regional Noxious Weed Management Strategy, when new, small weed infestations are detected, emphasize eradication of these infestations while providing for the safety of field personnel.

4 EXISTING ENVIRONMENT

4.1 Vegetation Types

The Project Area occurs within the Northern High Sierra Nevada Subregion of the California Floristic Province (Baldwin et al. 2012). SMUD facilities within the Project Area including roads, transmission lines, and structures (i.e., powerhouses, penstocks, recreational areas, etc.) are distributed among the varying habitats and topography; elevations range from approximately 1,800–6,500 feet (ft). Vegetation mapping information was obtained from the CALVEG datasets available through the California Land Cover Mapping and Monitoring Program (USFS 2016). Vegetation community types discussed in this section are based on the California Wildlife Habitat Relationships (CWHR) habitat classification scheme (Mayer and Laudenslayer 1988).

Vegetation with in the Project Area is dominated by Sierran Mixed Conifer (Table 2). Habitats that may support rare natural communities[1] (e.g., fens, lava caps) are interspersed. Three rare natural communities, lava caps, fens and sphagnum bogs, have been documented within the Project Area (Appendix A).

[1] Rare natural communities are defined as those natural community types with a ranking of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) by CDFW or of management concern for the Eldorado National Forest.

Table 2. Vegetation Types and Acreage in the Project Area.

California Wildlife Habitat Relationships Type	Ac
Annual Grassland (AGS)	67
Blue Oak Woodland (BOW)	5
Closed-Cone Pine-Cypress (CPC)	2
Jeffrey Pine (JPN)	39
Mixed Chaparral (MCH)	34
Montane Chaparral (MCP)	498
Montane Hardwood-Conifer (MHC)	59
Montane Hardwood (MHW)	256
Montane Riparian (MRI)	3
Perennial Grassland (PGS)	121
Ponderosa Pine (PPN)	119
Red Fir (RFR)	34
Sierran Mixed Conifer (SMC)	2,449
White Fir (WFR)	131
Wet Meadow (WTM)	77

4.2 Special-Status Plants

Appendix B includes a list of special-status plant species[2] that could occur in the Project Area based on habitat conditions (soils, habitat type, elevation, and distributional range). The list was developed by querying the following resources:

- The U.S. Fish and Wildlife Service (USFWS) list of federally listed and proposed endangered and threatened species (USFWS 2017),
- The California Native Plant Society's (CNPS) online Inventory of Rare and Endangered Vascular Plants of California (CNPS 2017),
- CDFW's California Natural Diversity Database (CNDDB) (CDFW 2017b), and
- Eldorado National Forest's (ENF's) Sensitive and Watch plant lists (ENF 2016, 2017a).

The USFWS, CNPS, and CNDDB database queries were each based on a search of the Project Vicinity which is defined as the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring). Appendices A and B list all rare natural communities and special-status plant species identified from the USFWS, CNPS, and

[2] Special-status species are defined as those listed, proposed, or under review as rare, threatened, or endangered by the federal or California state government, on the CDFW Special Vascular Plants, Bryophytes, and Lichens List (CDFW 2016a) with a California Rare Plant Rank (CRPR) of 1, 2, 3, or 4, and/or on ENF's Sensitive or Watch plant lists.

CNDDB database queries. Appendices C and D identify the current ENF Sensitive and Watch lists (ENF 2016, 2017a), respectively.

Information on known occurrences of special-status plant species and rare natural communities documented in the Project Area was compiled and plotted on a Geographic Information System (GIS) map; this included CNDDB spatial data for the Project, results of a comprehensive floristic surveys for special-status and target invasive plants conducted within the UARP boundary in 2000 and 2003 (DTA 2004) and 2016 (Atkins 2016) as well as the Eldorado National Forest 2017 botany geodatabase (2017b). Table 3 summarizes the Federally listed, ENF Sensitive and Watchlist plant species documented in the Project Vicinity; 64 of the 73 species have the potential to occur within the Project Area and a total of five ENF Sensitive plant species and thirteen ENF Watchlist plant species have been documented in the Project Area. No TEP plant taxa were documented within the Project Area. Section 4.2.1 provides location information for the ENF sensitive plant species documented in the Project Area and Section 4.2.2 provides location information for the ENF Watch List plant species documented in the Project Area.

Table 3. Federally listed, ENF Sensitive and Watch List species documented in the Project Vicinity[1]. Taxa that do not have potential habitat in the project area are not further analyzed in this document.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Federally Listed Species							
Packera layneae	Layne's ragwort	FT/CR/FSS/1B.2	April–August	200–1,085	perennial herb	Serpentinite or gabbroic rocky soils in chaparral and cismontane woodland	No; serpentinite or gabbroic soils are not found in the project area
ENF Sensitive Species							
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	April–August	1,100–3,000	perennial bulbiferous herb	Volcanic, chaparral, lower montane coniferous forest, Upper montane coniferous forest	Yes; potential habitat in the Project Area
Arcto*staphylos nissenana*	Nissenan manzanita	–/–/FSS/1B.2	February–March	450–1,100	perennial evergreen shrub	Rocky soils in closed-cone coniferous forest and chaparral	Yes; potential habitat in the Project Area
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	March–June	90–1,555	perennial herb	Sometimes serpentinite, chaparral, cismontane woodland, valley and foothill grassland	Yes; potential habitat in the Project Area
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	July–August	1,115–2,700	perennial rhizomatous herb	Mesic soils in lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	June–September	1,268–3,280	perennial rhizomatous herb	Bogs and fens, lower montane coniferous forest, meadows and seeps, freshwater marshes and swamps, and upper montane coniferous forest	Yes; documented in the Project Area (CDFW 2017b)
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	August	1,980–3,400	perennial rhizomatous herb	Meadows and seeps, subalpine coniferous forest, upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	July–September	1,455–2,180	perennial rhizomatous herb	Mesic soils in bogs and fens, lower montane coniferous forest, edges of meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium montanum	western goblin	–/–/FSS/2B.1	July–September	1,465–2,180	perennial rhizomatous herb	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	August	1,740–4,200	perennial rhizomatous herb	Limestone and marble alpine boulder and rock fields and moist areas of upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium pendunculosum	Stalked moonwort	–/–/FSS/2B.1	July-September	1,740–4,200	perennial rhizomatous herb	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May–July	305–1,800	perennial bulbiferous herb	Josephine silt loam and volcanic soils in lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	March – August	185–2,225	perennial rhizomatous herb	Broadleafed upland forest, cismontane woodland, lower montane coniferous forest, and north coast coniferous forest	Yes; potential habitat in the Project Area
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	July–August (September)	2,500–3,505	perennial herb	Alpine boulder and rock field, subalpine coniferous forest	No; outside of the Project Area elevation range
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	July–August (September)	2,500–2,815	perennial herb	Rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May–July	200–1,600	perennial deciduous shrub	Often serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	April–September	80–1,070	perennial herb	Ione formation and other soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	(April), May–August	765–2,365	perennial herb	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	(April), May–August	1,465–2,365	perennial herb	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	July–August (September)	2,500–2,925	perennial herb	Granitic soils in alpine boulder and rock field and mesic rocky areas of subalpine coniferous forest	No; outside of the Project Area elevation range
Lewisia serrata	saw-toothed	–/–/FSS/1B.1	May–June	770–1,435	perennial	Mesic, rocky slopes in broadleaved	Yes; documented

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
	lewisia				herb	upland forest, lower montane coniferous forest, and riparian forest	in the Project Area (CDFW 2017b)
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	April – July	600–2,000	annual herb	Vernally mesic, often disturbed areas, clay, lower montane coniferous forest, meadows and seeps.	Yes; potential habitat in the Project Area
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May–July	853–1,402	annual herb	Chaparral and cismontane woodland	Yes; documented in the Project Area (ENF 2017b)
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	July	1,000–2,000	perennial rhizomatous herb	Meadows and seeps and the margins of marshes and swamps	Yes; potential habitat in the Project Area
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May–July	610–2,010	annual herb	Cismontane woodland, lower montane coniferous forest, and meadows and seeps	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Pinus albicaulis	white bark pine	–/–/FSS/–	N/A	2,000–3,700	perennial evergreen tree	Upper red-fir forest to timberline, especially subalpine forest	No; outside of the Project Area elevation range
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	April–July	365–1,500	perennial rhizomatous herb	Openings in lower montane coniferous forest	Yes; potential habitat in the Project Area
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	Not applicable	1,700–2,800	moss	Damp soils in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	Not applicable	1,862–2,700	moss	Damp soil in meadows and seeps and subalpine coniferous forest	Yes; potential habitat in the Project Area
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	Not applicable	1,210–2,804	moss	Damp soil in bogs and fens, meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	Not applicable	0–1,960	moss	Metamorphic rock, usually acidic, usually vernally mesic, often roadsides, sometimes carbonate, broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest	Yes; potential habitat in the Project Area
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	fruits primarily in spring	160–1,827	fungi	Common under conifers in mature moist coniferous forests in northern CA and the Pacific Northwest. Typically associated with very rotten wood[4]	Yes; potential habitat in the Project Area
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	fruits September –December	6–962	fungi	Grows on ground in mixed woods and under conifers in southern Oregon and northern California[4]	Yes; potential habitat in the Project Area
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	Not applicable	1,065–2,620	foliose lichen (aquatic)	On rocks in cold water creeks with little or no sediment or disturbance in riparian forests	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
ENF Watchlist Species							
Allium sanbornii var. *congdonii*	Congdon's onion	–/–/FSW/4.3	April–July	300–990	perennial bulbiferous herb	Serpentine or volcanic soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Allium sanbornii var. *sanbornii*	Sanborn's onion	–/–/FSW/4.2	May–September	260–1,510	perennial bulbiferous herb	Usually serpentinite or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area
Astragalus austiniae	Austin's astragalus	–/–/FSW/1B.3	(May), July–September	2,440–2,970	perennial herb	Rocky soils in alpine boulder and rock field and subalpine coniferous forest	No; outside of the Project Area elevation range
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	–/–/FSW/4.3	July–August	2,135–3,050	perennial herb	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	Yes; potential habitat in the Project Area
Bolandra californica	Sierra bolandra	–/–/FSW/4.3	June–July	975–2,450	perennial herb	Mesic, rocky soils in lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area
Botrychium simplex	least moonwort	–/–/FSW/2B.3	May–September	1,500–3,200	perennial rhizomatous herb	In saturated moss or sedge mats around hard water seeps and streamlets	Yes; documented in the Project Area (ENF 2017b).
Calystegia vanzuukiae	Van Zuuk's morning-glory	–/–/FSW/1B.3	May–August	500–1,180	perennial rhizomatous herb	Gabbro, serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Carex cyrtostachya	Sierra arching sedge	–/–/FSW/1B.2	May–August	610–1,360	perennial herb	Mesic areas in lower montane coniferous forest, meadows and seeps, marshes and swamps, and the margins of riparian forests	Yes; potential habitat in the Project Area
Carex davyi	Davy's sedge	–/–/FSW/1B.3	May–August	1,500–3,200	perennial herb	Subalpine coniferous forest, upper montane coniferous forest	Yes documented in the Project Area (ENF 2017b)
Ceanothus fresnensis	Fresno ceanothus	–/–/FSW/4.3	May–July	900–2,103	perennial evergreen shrub	Openings in cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (ENF 2017b)

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Chaenactis douglasii var. *alpina*	alpine dusty maidens	–/–/FSW/2B.3	July–September	2,865–3,400	perennial herb	Granitic soils in alpine boulder and rock field	No; outside of the Project Area elevation range
Chlorogalum grandiflorum	Red Hills soaproot	–/–/FSW/1B.2	May–June	245–1,690	perennial bulbiferous herb	Serpentinite, gabbroic and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b)
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	–/–/FSW/4.2	May–July	75–915	annual herb	Often roadcuts in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Clarkia virgata	Sierra clarkia	–/–/FSW/4.3	May–August	400–1,615	annual herb	Cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Claytonia megarhiza	fell-fields claytonia	–/–/FSW/2B.3	July–September	2,600–3,532	perennial herb	In crevices between rocks in alpine boulder and rock field and rocky of gravelly soils of subalpine coniferous forest	No; outside of the Project Area elevation range
Corallorhiza trifida	northern coralroot	–/–/FSW/4.3	June–July	1,370–1,745	perennial rhizomatous herb (achlorophyl lous)	Mesic soils, lower montane coniferous forest, edges of meadows and seeps	Yes; potential habitat in the Project Area
Drosera anglica	English sundew	–/–/FSW/1B.1	June – September	1,300–2,255	perennial herb (carnivorous)	Bogs and fens, meadows and seeps with mesic soil	Yes; potential habitat in the Project Area
Drosera rotundifolia	round-leaved sundew	–/–/FSW/–	June–September	0–2,700	perennial herb	Swamps, wet meadows, forests, peatlands, often with Sphagnum	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & ENF 2017b).

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Dryopteris filix-mas	male fern	–/–/FSW/2B.4	July – September	2,400–3,100	perennial rhizomatous herb	Upper montane coniferous forest in granitic, rocky soils	No; outside of the Project Area elevation range
Eriogonum ovalifolium var. *eximium*	brown-margined buckwheat	–/–/FSW/4.3	June–August	1,800–3,400	perennial herb	Granitic and sandy soils in alpine boulder and rock field, and subalpine coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	–/–/FSW/4.3	May–June	320–610	annual herb	Serpentinite or lone soils in cismontane woodland	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Glyceria grandis	American manna grass	–/–/FSW/2B.3	June–August	15–1,980	perennial rhizomatous herb	Bogs and fens, meadows and seeps, and marshes and swamps along streambanks and lake margins	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Jensia yosemitana	Yosemite tarweed	–/–/FSW3.2	May–June	12–2,300	Annual herb	Spring-wet, sunny, sandy places, meadows	Yes; documented in the Project area (ENF 2017b)
Mimulus laciniatus	cut-leaved monkeyflower	–/–/FSW/4.3	April – July	490–2,650	annual herb	Mesic, granitic soils in chaparral, lower montane coniferous forest, and upper montane coniferous forests.	Yes; potential habitat in the Project Area
Myrica hartwegii	Sierra sweet bay	–/–/FSW/4.3	May–June	150–1,750	perennial deciduous shrub	Cismontane woodland, lower montane coniferous forest, and riparian forest	Yes; potential habitat in the Project Area
Orthotrichum holzingeri	Holzinger's orthotrichum moss	–/–/FSW/1B.3	Not applicable	715–1,800	moss	Usually on rock in and along streams, rarely on tree limbs, in cismontane woodland, lower montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Perideridia bacigalupii	Bacigalupi's yampah	–/–/FSW/4.2	June – August	450–1,035	perennial herb	Serpentine soils in chaparral and lower montane coniferous forest.	Yes; potential habitat in the Project Area
Rhynchospora alba	white beaked-rush	–/–/FSW/2B.2	June – August	60–2,040	perennial rhizomatous herb	Bogs and fens, meadows and seeps and freshwater marshes and swamps	Yes; potential habitat in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
Sparganium natans	small bur-reed	–/–/FSW/4.3	June – September	1,625–2,500	perennial rhizomatous herb (emergent)	Bogs and fens, meadows and seeps, marshes and swamps, along lake margins	Yes; potential habitat in the Project Area
Piperia colemanii	Coleman's Rein Orchid	–/–/FSW/4.3	May–July	1,188-2,300	perennial	Open conifer forest, scrub; often in sandy soils.	Yes; potential habitat in the Project Area
Piperia leptopetala	narrow-petaled rein orchid	–/–/FSW/4.3	May–July	380–2,225	perennial herb	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area
Pseudostellaria sierra	Sierra starwort	–/–/FSW/4.2	May–August	1,225–2,194	perennial rhizomatous herb	Chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (ENF 2017b)
Rhynchospora capitellata	brownish beaked-rush	–/–/FSW/2B.2	July–August	45–2,000	perennial herb	Mesic soils in lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest	Yes; potential habitat in the Project Area
Sambucus nigra subsp. *caerulea*	blue elderberry	–/–/FSW/–	Mar–Sep	0–3,000	shrub	Streambanks, open places in forest.	Yes; potential habitat in the Project Area
Streptanthus longisiliquus	long-fruit jewelflower	–/–/FSW/4.3	April–September	715–1,500	perennial herb	Openings in cismontane woodland, lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Taxus brevifolia	Pacific yew	–/–/FSW/–	Not applicable	10–2,150	shrub, small tree	Dense, mixed-evergreen forests, lower slopes, and canyon bottoms	Yes; documented in the Project Area (DTA 2004 & ENF 2017b)
Torreya californica	California nutmeg	–/–/FSW/–	Not applicable	10–2,100	tree	Shady moist canyons in forest or woodland, occasionally chaparral	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)
Viburnum ellipticum	oval-leaved viburnum	–/–/FSW/2B.3	May–June	215–1,400	perennial deciduous	Chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Blooming period[3]	Elevation range (meters)[3]	Lifeform	Habitat associations[3]	Potential habitat within the Project Area
					shrub		Project Area
Wyethia reticulata	El Dorado County mule ears	–/–/FSW/1B.2	April – August	185–230	perennial herb	Clay or gabbroic soils in chaparral, cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b)

[1] Project Vicinity includes the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

[2] Status:

Federal

FT Federally listed as threatened

– No federal status

State

CR California State listed as rare

– No state status

USFS

FSS USFS Sensitive

FSW USFS Watch List

California Rare Plant Rank (formerly known as CNPS Lists)

1B Plants rare, threatened, or endangered in California and elsewhere

2B Plants rare, threatened, or endangered in California, but more common elsewhere

3 More information needed about this plant, a review list

4 Plants of limited distribution, a watch list

CNPS Threat Ranks:

0.1 Seriously threatened in California (high degree/immediacy of threat)

0.2 Fairly threatened in California (moderate degree/immediacy of threat)

0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[3] All data from ENF (2016, 2017a), CNPS (2017), or Baldwin et al. (2012) unless otherwise noted.

[4] Information sources include Arora, D. 1986. Mushrooms demystified a comprehensive guide to the fleshy fungi. Second edition. Ten Speed Press, Berkeley, California; and USDA Forest Service and BLM (Bureau of Land Management). 2017. Interagency Special Status/Sensitive Species Program (ISSSSP). Website. https://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-fungi.shtml [Accessed September 20, 2017].

4.2.1 *ENF Sensitive Species Documented in the Project Area*

4.2.1.1 *Botrychium crenulatum (scalloped moonwort)*

Botrychium crenulatum (scalloped moonwort) is a perennial rhizomatous herb in the Ophioglossaceae family. It is threatened by grazing, foot traffic, recreational activities, trampling, fuel reduction projects, road deconstruction, and vehicles, and is possibly threatened by logging and hydrological alterations (CNPS 2017). Within the Project Area one occurrence of *Botrychium crenulatum* was documented in CNDDB (CDFW 2017b) approximately 0.7 miles west of Schlein Ranger Station. There are 13 occurrences on a total of 0.3 acre on the ENF (ENF 2017b).

4.2.1.2 *Calochortus clavatus var. avius (Pleasant Valley mariposa lily)*

Calochortus clavatus var. *avius* (Pleasant Valley mariposa lily) is a perennial bulbiferous herb in the Liliaceae family. It is threatened by development and logging, and is possibly threatened by horticultural collection and pipeline construction (CNPS 2017). Within the Project Area eight occurrences of *Calochortus clavatus* var. *avius* were documented throughout the Project Area in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b). There are 146 occurrences on a total of 117.5 acres on the ENF (ENF 2017b).

4.2.1.3 *Lewisia serrata (saw-toothed lewisia)*

Lewisia serrata (saw-toothed lewisia) is a perennial herb in the Onagraceae family. *Lewisia serrata* is threatened by small hydroelectric power projects and horticultural collecting, and is potentially threatened by recreational activities and road maintenance (CNPS 2017). Within the Project Area two occurrences of *Lewisia serrata* were documented in CNDDB (CDFW 2017b) at Junction Reservoir and Camino Reservoir. There are five occurrences on a total of 1.4 acres on the ENF (ENF 2017b).

4.2.1.4 *Navarretia prolifera subsp. lutea (yellow bur navarretia)*

Navarretia prolifera subsp. *lutea* (yellow bur navarretia) is an annual herb in the Polemoniaceae family. It is threatened by logging and maintenance vehicles (CNPS 2017). Within the Project Area one occurrence of *Navarretia prolifera* subsp. *lutea* was documented in the ENF 2017 database (ENF 2017b) under transmission line right of way near Cable Road. There are 84 occurrences on a total of 300 acres on the ENF (ENF 2017b).

4.2.1.5 *Phacelia stebbinsii (Stebbins' phacelia)*

Phacelia stebbinsii (Stebbins' phacelia) Stebbins' phacelia is an annual herb in the Boraginaceae family. It is potentially threatened by logging, trail maintenance and nonnative plants (CNPS 2017). *Phacelia stebbinsii* is locally abundant; within the Project Area 30 occurrences of *Phacelia stebbinsii* were documented in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along access roads to Jaybird Powerhouse and Camino Reservoir, Junction Reservoir, and Union Valley Powerhouse. There are 52 occurrences on a total of 146.7 acres on the ENF (ENF 2017b).

4.2.2 ENF Watch List Species Documented in the Project Area

4.2.2.1 *Botrychium simplex (least moonwort)*

Botrychium simplex (least moonwort) is a perennial rhizomatous herb in the Ophioglossaceae family. Within the Project Area one occurrence was documented in the ENF 2017 database (2017b) at Angel Creek. There are 45 occurrences on a total of 1.1 acre on the ENF (ENF 2017b).

4.2.2.2 *Carex davyi (Davy's sedge)*

Carex davyi (Davy's sedge) is a perennial herb in Cyperaceae family. Within the Project Area three occurrences were documented at the Loon Lake campground, Gerle Creek Campground, and near the South Fork of the Rubicon River. There are five occurrences documented on a total of 0.19 acres on the ENF (ENF 2017b).

4.2.2.3 *Ceanothus fresnensis (Fresno ceanothus)*

Ceanothus fresnensis (Fresno ceanothus) is a perennial evergreen shrub in the Rhamnaceae family. Within the Project Area and on the ENF, one occurrence was documented on a total of 0.3 acre (ENF 2017b) at Chaix Mountain.

4.2.2.4 *Chlorogalum grandiflorum (Red Hills soaproot)*

Chlorogalum grandiflorum (Red Hills soaproot) is a perennial bulbiferous herb in the Agavaceae family. Red Hills soaproot is threatened by development, mining, road construction, and vehicles; it is possibly threatened by trail maintenance, logging, and non-native plants (CNPS 2017). *Chlorogalum grandiflorum* is locally abundant; within the Project Area thirty-seven occurrences of *Chlorogalum grandiflorum* were documented in CNDDB (CDFW 2017b), the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along the access roads to Brush Creek, Jaybird Powerhouse and Camino Reservoir, the powerline near Poho ridge and the Forebay north of the South Fork American River. There are 49 occurrences on a total of 562.5 acres on the ENF (ENF 2017b).

4.2.2.5 *Clarkia biloba subsp. brandegeeae (Brandegee's clarkia)*

Clarkia biloba subsp. *brandegeeae* (Brandegee's clarkia) is an annual herb in the Onagraceae family. *Clarkia biloba* subsp. *brandegeeae* is threatened by weed control measures, non-native plants, road maintenance, fire suppression, and development (CNPS 2017). Within the Project Area one occurrence of *Clarkia biloba* subsp. *brandegeeae* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) including along Slab Creek Access Road and southwest of Slab Creek Reservoir. There is three occurrence on a total of 29.2 acres on the ENF (ENF 2017b).

4.2.2.6 *Clarkia virgata (Sierra clarkia)*

Clarkia virgata (Sierra clarkia) is an annual herb in the Onagraceae family. It is possibly threatened by road maintenance and non-native plants (CNPS 2017). Within the Project Area five occurrences of *Clarkia virgata* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) north of Forebay Road, at Jones Fork campground, and on Poho Ridge Road, Gasparni Road, and Parni Spur Road near Poho ridge. There are six occurrences on a total of 1.43 acres on the ENF (ENF 2017b).

4.2.2.7 *Drosera rotundifolia (round-leaved sundew)*

Drosera rotundifolia (round-leaved sundew) is a perennial, carnivorous herb in the Droseraceae family. Within the Project Area four occurrences of *Drosera rotundifolia* were documented in the UARP relicensing surveys (DTA 2004), the 2016 surveys (Atkins 2016), and/or the ENF 2017 database (2017b) below Ice House Dam. There are 20 occurrences on a total of 0.3 acre on the ENF (ENF 2017b).

4.2.2.8 *Eriogonum ovalifolium var. eximium (brown-margined buckwheat)*

Eriogonum ovalifolium var. *eximium* (brown-margined buckwheat) is a perennial herb in the Polygonaceae family. Within the Project Area one occurrence of *Eriogonum ovalifolium* var. *eximium* was documented in the 2016 surveys (Atkins 2016) and the ENF 2017 database (2017b) below Union Valley bike trail approximately 1,300 feet east of Wolf Creek Spur Rd. There is one occurrence on a total of 0.02 acre on the ENF (ENF 2017b).

4.2.2.9 *Githopsis pulchella subsp. serpentinicola (serpentine bluecup)*

Githopsis pulchella subsp. *serpentinicola* (serpentine bluecup) is an annual herb in the Campanulaceae family. Within the Project Area two occurrences of *Githopsis pulchella* subsp. *serpentinicola* were documented in the 2016 surveys (Atkins 2016) and/or the

ENF 2017 database (2017b) at Powerhouse Road and north of Forebay Road. There is one occurrence on a total of 0.6 acre on the ENF (ENF 2017b).

4.2.2.10 *Glyceria grandis (American manna grass)*

Glyceria grandis (American manna grass) is a perennial rhizomatous herb in the Poaceae family. Within the Project Area two occurrences of *Glyceria grandis* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) at Loon Lake campground. There is one occurrence on a total of 0.1 acre on the ENF (ENF 2017b).

4.2.2.11 *Piperia colemanii (Coleman's piperia)*

Piperia colemanii (Coleman's piperia) is a perennial herb in the Orchidaceae family. Within the Project Area one occurrences of *Piperia colemanii* was documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) across from the Camino Powerhouse. There are 31 occurrences on a total of 2.1 acre on the ENF (ENF 2017b).

4.2.2.12 *Pseudostellaria sierra (Sierra starwort)*

Pseudostellaria sierra (Sierra starwort) is a perennial rhizomatous herb in the Caryophyllaceae family. It is potentially threatened by logging and possibly threatened by vehicles (CNPS 2017). Within the Project Area one occurrence of *Pseudostellaria sierra* was documented in the 2017 survey (ENF 2017b) at Junction Reservoir. There are two occurrences on a total of 0.01 acre on the ENF (ENF 2017b).

4.2.2.13 *Streptanthus longisiliquus (long-fruit jewelflower)*

Streptanthus longisiliquus (long-fruit jewelflower) is a perennial herb in the Brassicaceae family. It is possibly threatened by logging and vehicles (CNPS 2017). Within the Project Area six occurrences of *Streptanthus longisiliquus* were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) along roads and along transmission line right of way west of Union Valley Reservoir. There are six occurrences on a total of 11.9 acres on the ENF (ENF 2017b).

4.2.2.14 *Taxus brevifolia (Pacific yew)*

Taxus brevifolia (Pacific yew) is a shrub or small three in the Taxaceae family. Within the Project Area four occurrences of *Taxus brevifolia* were documented in the UARP relicensing surveys (DTA 2004) and/or the ENF 2017 database (2017b) along transmission line right of way. There are 12 occurrences on a total of 9.0 acres on the ENF (ENF 2017b).

4.2.2.15 *Torreya californica (California nutmeg)*

Torreya californica (California nutmeg) is small coniferous tree in the Taxaceae family. It is endemic to California and is an ENF Watch List species. Within the Project Area two occurrences of Torreya californica were documented in the 2016 surveys (Atkins 2016) and/or the ENF 2017 database (2017b) along Eldorado Powerhouse Road. There are 58 occurrences on a total of 72.9 acres on the ENF (ENF 2017b).

4.2.2.16 *Wyethia reticulata (El Dorado mule ears)*

Wyethia reticulata (El Dorado mule ears) is a perennial herb in the Asteraceae family. It is endemic to California and is an ENF Watch List species.

Within the Project Area one occurrence of *Wyethia reticulata* was documented in 2016 surveys (Atkins 2016) along the Transmission Line near Forebay Road.

5 EFFECTS OF THE PROPOSED PROJECT

5.1 Risk Assessment

The application of herbicides to vegetation requires a careful assessment of risk to human health and the environment, particularly wildlife and plant life; the purpose of this section is to assess the risks to botanical resources of using the herbicides and surfactants prescribed in the VIWMP.

To assess the risk associated with the use of a specific pesticide, SMUD uses Risk Assessment Worksheets (WorksheetMaker, version 6.01.16), which are a computational tool developed by Syracuse Environmental Research Associates, Inc. (SERA) for the USFS. These are models that attempt to quantify the risk to various receptors based on relative toxicity and assumed exposure scenarios, which are typically very conservative and do not consider mitigating Resource Protection Measures employed by applicators. Exposure scenarios are explained in the risk assessment reports for each of these herbicides prepared by SERA. These risk assessments are incorporated by reference and can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml.

These worksheets are designed to assess risk by comparing a potential exposure dose with the daily reference dose (RfD) established by the U.S. EPA (EPA). The RfD is a level of exposure at or below which no acute or chronic health effects are expected to occur; it can be considered the equivalent of an acceptable daily intake. Risk is expressed in the form of a hazard quotient (HQ), which is computed as the ratio of proposed exposure dose to the RfD. HQs $\leq$1.0 are considered by the USFS to pose insignificant risk to human health or the environment. Proposed application rates are listed in Table 4. These spreadsheets have been developed over several years and are continually revised and improved to provide the best possible analysis. The assessment capabilities are not the same for each compound; in each scenario, the best and most plausible scenarios are evaluated.

Table 4. Comparison of the Proposed Chemicals and Application Rates

Chemical	Proposed Maximum Application Rate
Aminopyralid	0.11 a.e. lbs/ac
Chlorsulfuron	0.05 ai lb/ac
Clopyralid	0.14 a.e. lbs/ac
Glyphosate	2 a.e. lbs/ac
Imazapyr	0.33 a.e. lbs/ac
Sulfometuron Methyl	0.14 ai lbs/ac
Triclopyr (TEA)	2 a.e. lbs/ac
Triclopyr (BEE)	2 a.e. lbs/ac

Application rate units: acid equivalent pounds per acre (a.e. lbs./acre)

Identifying the people, aquatic and terrestrial wildlife, and plants likely to be exposed to herbicides due to the project and then estimating doses for these potentially exposed individuals were the basis for the exposure analysis. This analysis estimates potential exposure and projects subsequent risk from pesticide applications. The spreadsheets consider multiple rates along with the volume exposures. The central application rate represents the most likely rate to be prescribed and is the rate that is assessed. Most important to the evaluation is the impact of application volume and the subsequent concentration mixed in the field. All risk assessments consider the range of application volumes, field concentration, and subsequent potential exposures.

Each herbicide-specific spreadsheet analyzes four human and five environmental (plant and animal) risk potentials. Sections 5..2.1 through 5.2.10 provide an analysis of potential effects of the project on non-target, sensitive plants (i.e., those that are tolerant of the applied herbicide) including special-status species.

5.1.1 *Model Assumptions for Drift Analysis*

Documentation from the SERA Worksheet Maker, Version 6.01 User Guide provides information on the assumptions used to determine the risk of drift (Durkin 2016). According to the SERA documentation, the drift model used is from AgDRIFT, a model developed by the EPA. The worksheets use Tier 1 analysis (a generic and simple assessment that should be considered the upper limit of drift). The backpack model was selected in all cases and the model parameters assume that applications would be from a low boom (tractor-based boom, 20 inches (in) from ground) and droplets are assumed to be a distribution of Fine to Medium size (100-250 Microns) with estimates of drift in the

50^{th} percentile, meaning that the model assumes droplets will travel a distance equal to that in which 50% of the droplets traveled in field tests. Drift from an actual backpack application would be much less according to the documentation and there are currently not good models for backpack applications (Durkin 2016).

Many of the applications in the UARP will be actual backpack applications targeting undesirable vegetation with applicators directing the spray. UARP sprayers are equipped with nozzles that produce medium (350 Microns) and greater size droplets, which don't travel as far. Nozzle height can be raised or lowered and is not fixed. Sprays will only occur when wind speeds are less than 5 mph.

5.2 Direct and Indirect Effects

The project could directly affect individual plants of special-status species documented within the Project Area by damaging or destroying them as a result of access to or during manual treatment activities. Special-status species as well as non-target, sensitive plants could also be affected by the direct application of herbicides to individual plants. Table 5 provides the list of ENF Sensitive and ENF Watch List species that could potentially be affected by mechanical treatments and/or direct application of herbicides, including bloom time and locality information for those species that have been documented in the Project Area.

Table 5. Federally list, ENF Sensitive and Watch List species with the potential to occur in the Project Area.

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Federally Listed Species													
Packera layneae	Layne's ragwort	Asteraceae	perennial herb	FT/CR/FSS/1B.2									
ENF Sensitive Species													
Allium tribracteatum	three-bracted onion	Alliaceae	perennial bulbiferous herb	–/–/FSS/1B.2									
Arctostaphylos nissenana	Nissenan manzanita	Ericaceae	perennial evergreen shrub	–/–/FSS/1B.2									
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	Asteraceae	perennial herb	–/–/FSS/1B.3									
Botrychium ascendens	upswept moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.3									
Botrychium crenulatum	scalloped moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2	One occurrence; approximately 0.7 miles west of Schlein Ranger Station								
Botrychium lunaria	common moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.3									
Botrychium minganense	Mingan moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2									
Botrychium montanum	western goblin	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Botrychium paradoxum	paradox moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Botrychium pendunculosum	Stalked moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.1									
Calochortus clavatus var.	Pleasant Valley mariposa lily	Liliaceae	perennial bulbiferous herb	–/–/FSS/1B.2	Eight occurrences; throughout Project Area								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
avius													
Cypripedium montanum	mountain lady's-slipper	Orchidaceae	perennial rhizomatous herb	–/–/FSS/4.2									
Draba asterophora var. *asterophora*	Tahoe draba	Brassicaceae Brassicaceae	perennial herb	–/–/FSS/1B.2									
Draba asterophora var. *macrocarpa*	Cup Lake draba	Brassicaceae	perennial herb	–/–/FSS/1B.1									
Eriogonum tripodum	tripod buckwheat	Polygonaceae	perennial deciduous shrub	–/–/FSS/4.2									
Horkelia parryi	Parry's horkelia	Rosaceae	perennial herb	–/–/FSS/1B.2									
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	Montiaceae	perennial herb	–/–/FSS/3.2									
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	Montiaceae	perennial herb	–/–/FSS/3.2									
Lewisia longipetala	long-petaled lewisia	Montiaceae	perennial herb	–/–/FSS/1B.3									
Lewisia serrata	saw-toothed lewisia	Montiaceae	perennial herb	–/–/FSS/1B.1	Two occurrences; one at Union Valley Reservoir and one at Camino Reservoir								
Mimulus pulchellus	yellow-lip pansy monkeyflower	Phrymaceae	annual herb	–/–/FSS/1B.2									
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	Polemoniaceae	annual herb	–/–/FSS/4.3	One occurrence; under transmission line right of way near Cable Road								
Ophioglossum pusillum	northern adder's-tongue	Ophioglossaceae	perennial rhizomatous herb	–/–/FSS/2B.2									
Phacelia stebbinsii	Stebbins' phacelia	Hydrophyllaceae	annual herb	–/–/FSS/1B.2	30 occurrences; throughout Project Area including								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time: March	April	May	June	July	August	September	October
					along access roads to Jaybird Powerhouse and Camino Reservoir, Junction Reservoir, and Union Valley Powerhouse.								
Pinus albicaulis	White Bark Pine	Pinaceae	perennial evergreen tree	–/–/FSS/–		Not applicable							
Poa sierrae	Sierra blue grass	Poaceae	perennial rhizomatous herb	–/–/FSS/1B.3									
Bruchia bolanderi	Bolander's bruchia	Bruchianceae	moss	–/–/FSS/4.2		Not applicable							
Helodium blandowii	Blandow's bog moss	Helodiaceae	moss	–/–/FSS/2B.3		Not applicable							
Meesia uliginosa	broad-nerved hump moss	Meesiaceae	moss	–/–/FSS/2B.2		Not applicable							
Mielichhoferia elongata	elongate copper moss	Mielichhoferiaceae	moss	–/–/FSS/4.3		Not applicable							
Dendrocollybia racemosa	branched collybia	Cudoniaceae	fungi	–/–/FSS/–		Fruits primarily in spring							
Phaeocollybia olivacea	olive phaeocollybia	Cortinariaceae	fungi	–/–/FSS/–		Fruits September through December							
Peltigera gowardii	western waterfan lichen	Peltigeraceae	foliose lichen (aquatic)	–/–/FSS/4.2		Not applicable							
ENF Watch List Species													
Allium sanbornii var. *congdonii*	Congdon's onion	Alliaceae	perennial bulbiferous herb	–/–/FSW/4.3									
Allium sanbornii var. *sanbornii*	Sanborn's onion	Alliaceae	perennial bulbiferous herb	–/–/FSW/4.2									
Astragalus austiniae	Austin's astragalus	Fabaceae	perennial herb	–/–/FSW/1B.3									

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	Fabaceae	perennial herb	–/–/FSW/4.3									
Bolandra californica	Sierra bolandra	Saxifragaceae	perennial herb	–/–/FSW/4.3									
Botrychium simplex	least moonwort	Ophioglossaceae	perennial rhizomatous herb	–/–/FSW/1B.3	One occurrence; at Angel Creek								
Calystegia vanzuukiae	Van Zuuk's morning-glory	Convolvulaceae	perennial rhizomatous herb	–/–/FSW/1B.3									
Carex cyrtostachya	Sierra arching sedge	Cyperaceae	perennial herb	–/–/FSW/1B.2									
Carex davyi	Davy's sedge	Cyperaceae	perennial herb	–/–/FSW/1B.3	Three occurrences; Loon Lake Campground, Gerle Creek Campground, and near the South Fork of the Rubicon River.								
Ceanothus fresnensis	Fresno ceanothus	Rhamnaceae	perennial evergreen shrub	–/–/FSW/4.3	One occurrence; Chaix Mountain								
Chaenactis douglasii var. *alpina*	alpine dusty maidens	Asteraceae	perennial herb	–/–/FSW/2B.3									
Chlorogalum grandiflorum	Red Hills soaproot	Agavaceae	perennial bulbiferous herb	–/–/FSW/1B.2	37 occurrences; throughout Project Area including along the access roads to Brush Creek, Jaybird Powerhouse and Camino Reservoir, the powerline near Poho ridge and the Forebay north of the South Fork American River.								
Clarkia biloba	Brandegee's	Onagraceae	annual herb	–/–/FSW/4.2	Six occurrences; mainly								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time March	April	May	June	July	August	September	October
subsp. *brandegeeae*	clarkia				around Slab Creek Road southwest of Slab Creek Reservoir								
Clarkia virgata	Sierra clarkia	Onagraceae	annual herb	–/–/FSW/4.3	Five occurrences; including north of Forebay Road, at Jones Fork campground, and on Poho Ridge Road, Gasparni Road, and Parni Spur Road near Poho ridge								
Claytonia megarhiza	fell-fields claytonia	Montiaceae	perennial herb	–/–/FSW/2B.3									
Corallorhiza trifida	northern coralroot	Orchidaceae	perennial rhizomatous herb (achlorophyllous)	–/–/FSW/–									
Drosera anglica	English sundew	Droseraceae	perennial herb (carnivorous)	–/–/FSW/2B.2									
Drosera rotundifolia	Round-leaved sundew	Droseraceae	perennial herb	–/–/FSW/–	Four occurrences; below Ice House Dam								
Dryopteris filix-mas	male fern	Dryopteridaceae	perennial rhizomatous herb	–/–/FSW/2B.4									
Eriogonum ovalifolium var. *eximium*	brown-margined buckwheat	Polygonaceae	perennial herb	–/–/FSW/4.3	One occurrence; below Union Valley bike trail approximately 1,300 feet east of Wolf Creek Spur Rd								
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	Campanulaceae	annual herb	–/–/FSW/4.3	Two occurrences; at transmission line right of way, one at Powerhouse Road and one north of Forebay Road								
Glyceria grandis	American manna grass	Poaceae	perennial rhizomatous herb	–/–/FSW/2B.3	Two occurrences; at Loon Lake campground								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
Jensia yosemitana	Yosemite tarweed	Asteraceae	Annual herb	–/–/FSW/3.2									
Mimulus laciniatus	cut-leaved monkeyflower	Phrymaceae	annual herb	–/–/FSW/4.3									
Myrica hartwegii	Sierra sweet bay	Myricaceae	perennial deciduous shrub	–/–/FSW/4.3									
Perideridia bacigalupii	Bacigalupi's yampah	Apiaceae	perennial herb	–/–/FSW/4.2									
Orthotrichum holzingeri	Holzinger's orthotrichum moss	Orthotrichaceae	moss	–/–/FSW/1B.3		Not applicable							
Pinus monophylla	two-needle pinyon pine	Pinaceae	perennial evergreen tree	–/–/FSW/3.3		Not applicable							
Piperia colemanii	Coleman's rein orchid	Orchidaceae	perennial herb	–/–/FSW/4.3									
Piperia leptopetala	narrow-petaled rein orchid	Orchidaceae	perennial herb	–/–/FSW/4.3									
Pseudostellaria sierrae	Sierra starwort	Caryophyllaceae	perennial rhizomatous herb	–/–/FSW/4.2	One occurrence; at Junction Reservoir								
Rhynchospora capitellata	brownish beaked-rush	Cyperaceae	perennial herb	–/–/FSW/2B.2									
Rhynchospora alba	white beaked-rush	Cyperaceae	perennial rhizomatous herb	–/–/FSW/2B.2									
Sparganium natans	small bur-reed	Typhaceae	perennial rhizomatous herb (emergent)	–/–/FSW/4.3									
Sambucus nigra subsp. *caerulea*	blue elderberry	Adoxaceae	shrub	–/–/FSW/–									
Streptanthus	long-fruit	Brassicaceae	perennial herb	–/–/FSW/4.3	Six occurrences; along								

Scientific name	Common name	Family	Lifeform	Status[1] Federal /State/ USFS/ CRPR	Location Information within the Project Area	Bloom time							
						March	April	May	June	July	August	September	October
longisiliquus	jewelflower				roads and along transmission line right of way west of Union Valley Reservoir								
Taxus brevifolia	Pacific yew	Taxaceae	tree	–/–/FSW/–	Four occurrences; along transmission line right of way	Not applicable							
Torreya californica	California nutmeg	Taxaceae	tree	–/–/FSW/–	Two occurrences; along Eldorado Powerhouse Road	Not applicable							
Viburnum ellipticum	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	–/–/FSW/2B.3									
Wyethia reticulata	El Dorado County mule ears	Asteraceae	perennial herb	–/–/FSW/1B.2	One occurrence; transmission line near Forebay Road								

[1] Status:
Federal
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare

–	No state status
USFS	
FSS	USFS Sensitive
FSW	USFS Watch List
California Rare Plant Rank (formerly known as CNPS Lists)	
1B	Plants rare, threatened, or endangered in California and elsewhere
2B	Plants rare, threatened, or endangered in California, but more common elsewhere
3	More information needed about this plant, a review list
4	Plants of limited distribution, a watch list
CNPS Threat Ranks:	
0.1	Seriously threatened in California (high degree/immediacy of threat)
0.2	Fairly threatened in California (moderate degree/immediacy of threat)
0.3	Not very threatened in California (low degree/immediacy of threats or no current threats known)

The risk from direct-impact scenarios will be reduced by implementation of multiple measures as outlined it Section 5 of the VIWMP. These measures include comprehensive surveys for special-status plant and invasive weed populations every five years (PM-8) and annual consultation to review the most current list of special-status plant species and invasive weeds that might occur in the Project Area directly affected by Project operations (PM-9). If any previously unidentified occurrences are noted, then SMUD would manage them according to the provisions in the VIWMP. Prior to mechanical treatment all ENF Sensitive species will be flagged for avoidance; if a treatment (e.g., string trimming) will occur adjacent to an annual species it will be timed to occur once the species has gone to seed. Similarly, for annual ENF Watch List plant species, herbicide applications will be timed to occur once they have set seed where feasible. Direct-impacts to select watch list plants (*Carex davyi, Eriogonum ovalifolium var. eximium, Githopsis pulchella ssp. serpentinicola. Glyceria grandis, Streptanthus longisiliquus,* and *Wyethia reticulata*) that are uncommon on the Eldorado National Forest will also be avoided. Finally, herbicide exclusion buffers will be established for ENF Sensitive Plants as described in the Table 6 below.

Table 6. Herbicide Exclusion Buffers around ENF Sensitive Plants.

Herbicide	Maximum Distance from ENF Sensitive Plants (feet)[1]
Aminopyralid	200
Chlorosulfron	100
Clopyralid	50
Glyphosate	50
Imazapyr	100
Sulfometuron methyl	100
Triclopyr BEE	200
Triclopyr TEA	50

[1] Measured from exterior edge of ENF Sensitive plant occurrence; exceptions for buffer distances can be made when approved by USFS or BLM botanist.

Flagging and buffers around ENF Sensitive plants will not be implemented along specific sections of access roads (Figures 2–4). In these areas potential risks outweigh the benefits; establishing no-spray buffers encourages the proliferation of invasive plants and can create an unsafe situation if vegetation grows tall enough to restrict visibility for drivers and increases fire danger. As indicated in Figures 2–4, two ENF Sensitive species, *Phacelia stebbinsii* and *Calochortus clavatus* var. *avius* are documented in these areas. For these roadside occurrences, herbicide application would likely kill any individuals located within 10 feet of the road shoulder since applications would occur in the spring when both species would be susceptible to herbicide exposure. Prior to 2014 many of these population may have been treated mechanically or with herbicides by SMUD, but all occurrences have been flagged and avoided since 2014 during annual O&M activities.

In many cases the roadside occurrences have been present at least since 2000 through 2003 when surveys were originally performed for the UARP. The southern population of *Phacelia stebbinsii* along Jaybird Powerhouse Road (Figure 2, lower circle) has been documented in all surveys in the area (DTA 2004, CDFW 2017b and Atkins 2016) and has increased in extent. However, much of the population to the north (Figure 2, upper circle) documented by DTA in 2004 was not relocated in 2016 (Atkins 2016). Overall, the *Phacelia stebbinsii* occurrences along Jaybird Powerhouse Road have decreased both in extent and density with over 2,000 individuals observed in 2002 (DTA 2004) in numerous discrete patches in the switchback road cuts along Jaybird Powerhouse Road, and only 775 individuals counted in 2016 at three loci. Additional monitoring by the Forest Service occurred at the northern populations along Jaybird Powerhouse Road (PHST_006-03) in 1999 and 2008. Neither visit included population counts, but it was noted that fewer plants were observed at the site than when it was lasted visited. Much of the decrease in extent has occurred at the northern occurrences (PHST6_006 and PHST6_029). There is also one historic occurrence of *Calochortus clavatus* var. *avius* along Jaybird Canyon Road (Figure 2. upper circle) that was initially discovered in 1993 growing in and above the road cut. However, the population was not relocated in 2000 or 2003 (DTA 2004) or in 2016 (Atkins 2016) and may have been extirpated. For the occurrences of *Phacelia stebbinsii* along Jaybird Powerhouse Road last observed in 2016, it is expected that only a fraction of the occurrences would be impacted by roadside herbicide applications which should allow for the remaining occurrences to persist despite the potential loss of individual plants within 10 feet of the road edge.

Similarly, at Union Valley Reservoir one population of *Phacelia stebbinsii* (Figure 3, lower circle) was documented in multiple surveys in the area since it was discovered in 1979 and the extent and density of the population has remained relatively stable (DTA 2004, CDFW 2017b, and Atkins 2016). Another population (Figure 3, middle circle) has also remained relatively stable since being discovered in 1979, although in 1983 over 1,000 plants were observed but only 400 individuals were noted by Atkins in 2016 (DTA 2004, and Atkins 2016). Therefore, for the populations at Union Valley Reservoir there is some evidence that the populations have persisted despite years of annual mechanical and/or herbicide applications in many cases, although since 2014 the occurrences have been flagged and avoided. This is because the populations of these plants extend beyond the road prism so the loss of individuals adjacent to the road has not impacted the entire population.

For the occurrence of *Phacelia stebbinsii* and *Calochortus clavatus* var. *avius* that are relatively new (i.e., *Phacelia stebbinsii* in Figure 2, right circle; *Calochortus clavatus* var. *avius* Figure 4, right circle [CDFW 2017b, Atkins 2016 and ENF 2017b) they may also persist despite potential loss of individuals from herbicide application or mechanical treatments to the extent that populations extend beyond the road prism. While the *Phacelia stebbinsii* occurrence (PHST6_053-02) extends beyond the road prism the *Calochortus clavatus* var. *avius* (CACLA_142-03) was noted to only occur in the road cut along Crooked Silver Road. Given the limited extent of the population, it is possible that the *Calochortus clavatus* var. *avius* would be extirpated by proposed herbicide application and mechanical roadside vegetation management.

However, even with the potential loss of individuals and potentially a population of *Calochortus clavatus* var. *avius* (CACLA_143-03), both populations represent a small fraction of the total number of occurrences and also extent of these species both within the Project Area and also across the ENF as described in Sections 4.2.1.2 and 4.2.1.5; therefore, the potential loss is not likely to affect species viability or lead to a trend towards federal listing.

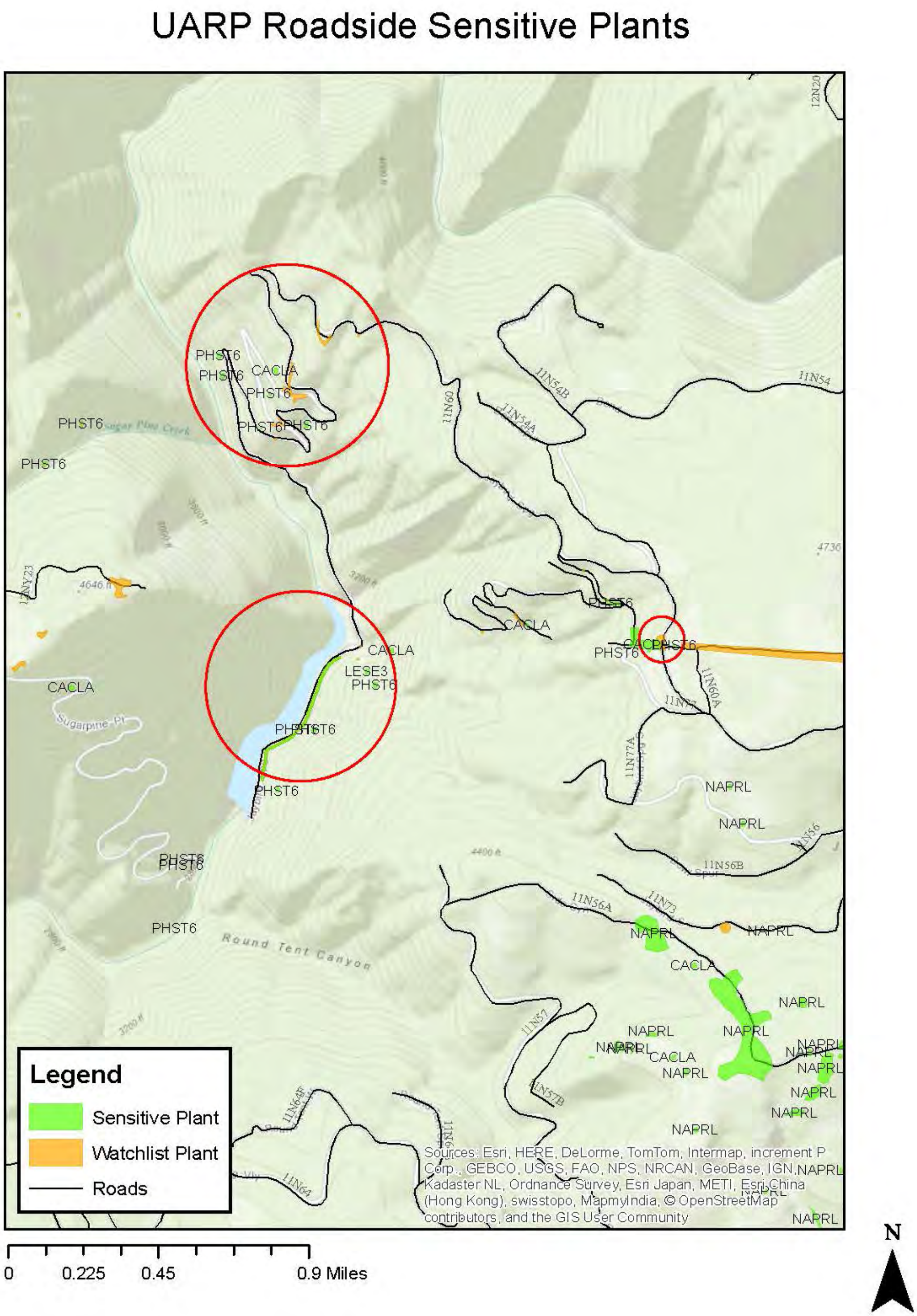


Figure 2. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species along Jaybird Powerhouse Road.

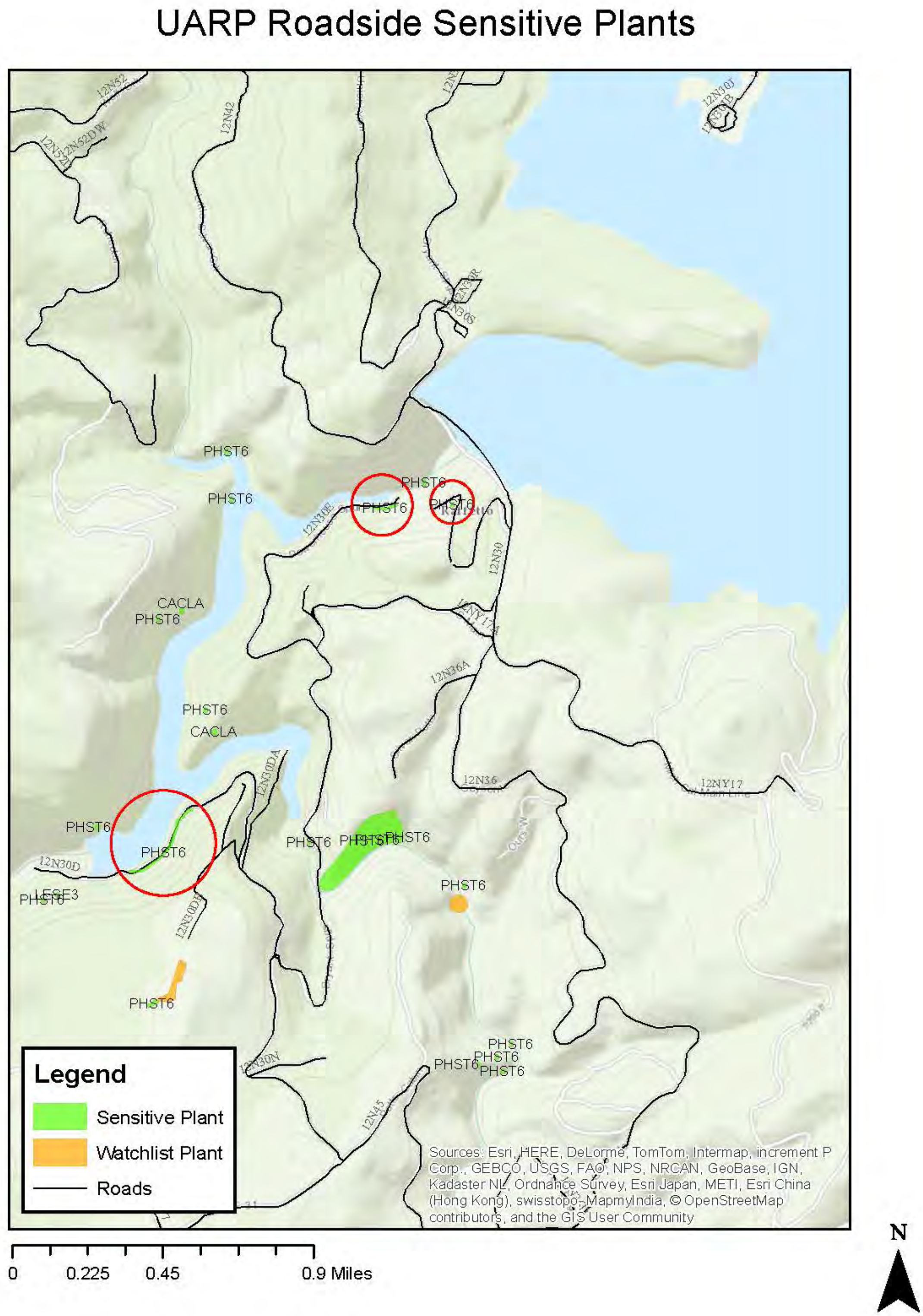


Figure 3. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species near Union Valley Reservoir.

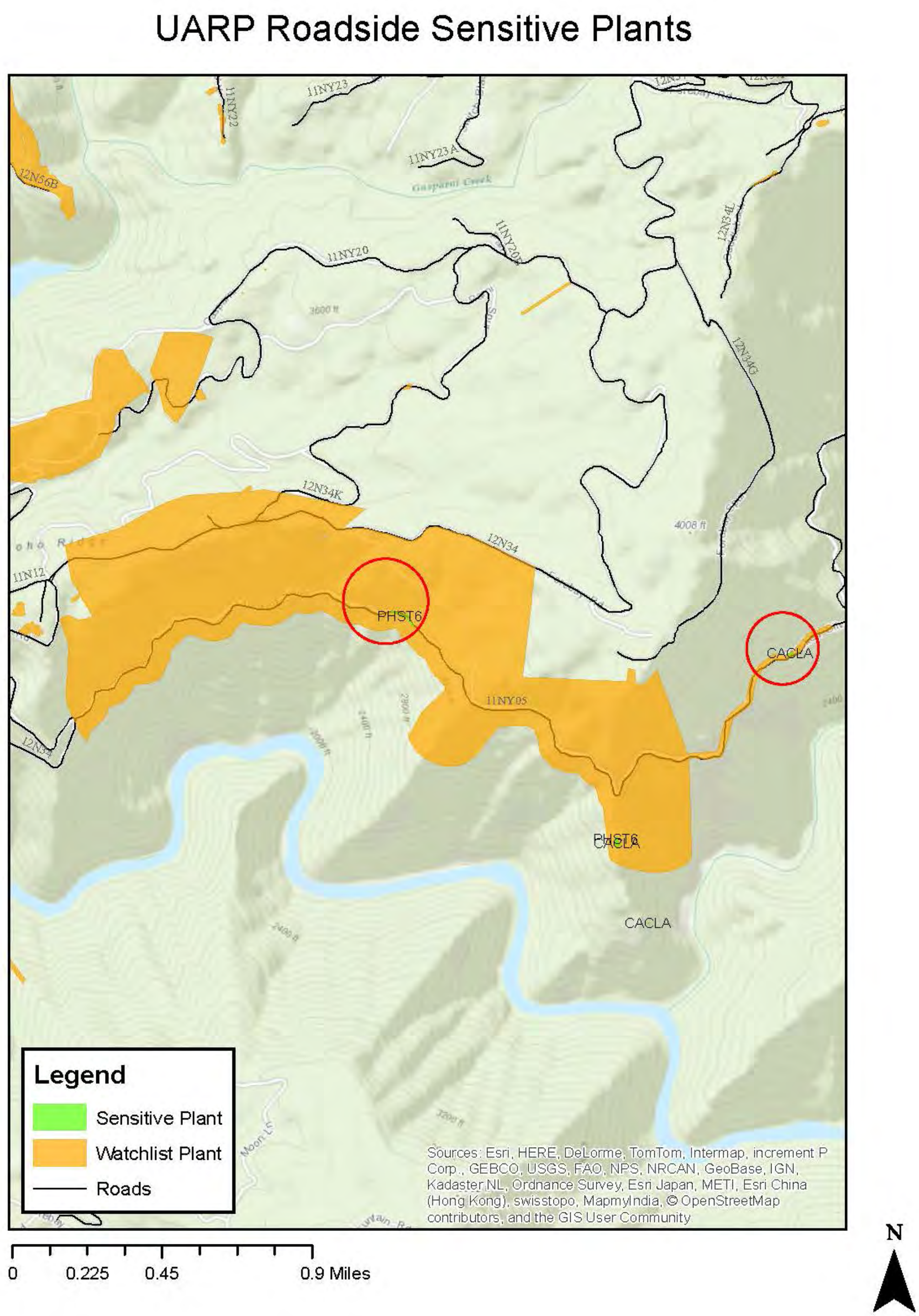


Figure 4. Locations (red circles) where herbicides applications would occur without applying buffers to ENF Sensitive Species along Camino Adit Road (11NY05).

Flagging and buffers around ENF watch-list species that are prevalent within the project area would not occur because avoiding these species would interfere with the SMUD's ability to manage incompatible vegetation. Expected effects of the proposed vegetation management will vary for each species. For *Clarkia biloba* ssp. *brandegeeae* and *Clarkia virgata* SMUD will attempt to delay treatments until after plants have set seed (when feasible). Where plants occur along access roads it is expected that only a fraction of individuals would be impacted by roadside spraying allowing for the population to persist regardless of the timing of herbicide application. However, *Clarkia virgata* occurs within the transmission corridor and could be extirpated if the entire population is sprayed or disturbed prior to seed set.

Chlorogalum grandiflorum is very common throughout the project area with over 82 occurrences documented within transmission corridors, roadways, and recreation areas throughout the project area. Plants would likely tolerate some mechanical disturbance as long as they are not uprooted or buried in thick mulch, but direct herbicide application during periods of active growth will result in loss of individuals and likely some occurrences.

There is only one individual of *Ceanothus fresnensis* documented in the project area within the transmission ROW near Chaix Mountain. It is likely that mechanical and chemical treatments will extirpate this population. *Drosera rotundifolia* is known from the project area below the dam at Ice House Reservoir. Since this population occurs within the stream channel direct impacts from the project are not expected. There are four populations of *Torreya californica* in the project area, two of which occur in the transmission ROW and will likely be impacted. The other two occur along access roads and are unlikely to be targeted during roadside vegetation management. There is only one individual of *Piperia colemanii* in the project area along the access road to the Camino Power house. It is expected that roadside vegetation management will extirpate this population.

Special-status plant species and non-targeted sensitive plants may also be impacted by multiple, indirect effects such as herbicide drift or runoff from adjacent treatments. Drift is the airborne movement of herbicides, usually associated with mechanical application techniques such as sprays. Runoff is the transport of herbicides in water, generally associated with rain, across the landscape and potentially into waterways. Tables 7 and 8 provide HQs for acute exposure scenarios for terrestrial plants and Sections 7.2.1 through 7.2.10 provides an assessment of potential risks to special-status plant species and non-targeted sensitive plants by herbicide. While the HQs may show potential for impacts to the special-status plant species, the analyses are extremely conservative as compared to field studies] and the risk from these indirect impacts will be reduced by implementation of the various protection measures outlined in Section 5 of the VIWMP including the following:

- **BMP-14**: SMUD PCOs will apply chemical treatments according to label directions, prescriptions, and all applicable laws and regulations governing the use of pesticides; pesticide label requirements will be followed. A licensed Pest Control Advisor (PCA) will be consulted in the planning and execution of all herbicide applications. Individuals with a Qualified Applicator's License or Certificate (QAL or QAC) from the California Department of Pesticide Regulation (Cal DPR) will oversee applications on the ground.
- **BMP-15**: When using herbicides, SMUD PCO's will use the most specifically targeted application method that can effectively achieve program goals.
- **BMP-20:**
    - Measures to control pesticide drift during spray application will include, but are not limited to:
        - Using ground-based application equipment;
        - Using spray nozzle that produces >200 micron or greater droplets;
        - Using nozzle pressures below 25 PSI on backpacks;
        - Using spray nozzles no higher than 2 feet from the ground;
        - Using ground application directed away from non-target]vegetation.
    - Drift reduction nozzles may be employed where warranted.
- **BMP-21:** Chemical treatments shall occur when weather and soil conditions are favorable. Application can proceed if weather conditions appear favorable, which is when there is a 30% or less chance of rain on the day of application (according to NOAA); if precipitation is predicted within 48 hours, the amount predicted shall be no more than ¼- inch; sustained winds are less than 5 MPH; and rain does not appear likely at the time of application.

Table 7. Summary of Exposure Assessment[1] and Risk Characterization for Sensitive Terrestrial Plants from Runoff; Clay Soil.[2]

Chemical	Aminopyralid		Chlorsulfuron[3]		Clopyralid		Glyphosate		Imazapyr		Sulfometuron Methyl[4]		Triclopyr (TEA)		Triclopyr (BEE)	
Toxicity value (lb/ac)	*.00048*		*.000035*		*.025*		*3.6*		*.00017*		*.0000086*		*.0028*		*.022*	
Rainfall (in)	**EA**	**HQ[5]**	**EA**	**HQ**	**EA**	**HQ**	**EA[6]**	**HQ**	**EA[6]**	**HQ**	**EA**	**HQ**	**EA[6]**	**HQ**	**EA[6]**	**HQ**
5	0	0E00	*0*	0E00	*0*	0E00	NA	.05	NA	11	*0*	0E00	NA	8	NA	4
10	0	0E00	*0*	0E00	*0*	0E00	NA	.05	NA	11	*0*	0E00	NA	8	NA	4
15	0.001309	**3**	*0.002251*	**64**	*0.00602*	0.2	NA	.05	NA	11	*0.002352*	**273**	NA	8	NA	4
20	0.001705	**4**	*0.003893*	**111**	*0.0105*	0.4	NA	.05	NA	11	*0.005068*	**589**	NA	8	NA	4
25	0.001969	**4**	*0.005424*	**155**	*0.0147*	0.6	NA	.05	NA	11	*0.008064*	**938**	NA	8	NA	4
50	0.002574	**5**	*0.011184*	**320**	*0.0308*	**1.2**	NA	.05	NA	11	*0.02268*	**2,637**	NA	8	NA	4
100	0.0033	**7**	*0.018576*	**531**	*0.0511*	**2**	NA	.05	NA	11	*0.04648*	**5,405**	NA	8	NA	4
150	0.004015	**8**	*0.023232*	**664**	*0.06342*	**3**	NA	.05	NA	11	*0.06328*	**7,358**	NA	8	NA	4
200	0.004752	**10**	*0.026448*	**756**	*0.07168*	**3**	NA	.05	NA	11	*0.07112*	**8,270**	NA	8	NA	4

[1] EA (Exposure Assessment): The equivalent rate of runoff as a percent of the original application rate; measured in lbs/ac.
[2] Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.
[3] Chlorsulfouron HQs exceed 1 for loam soils at rainfall ranges between 100 and 200 in
[4] Sulfometuron methyl HQ's exceed 1 for loam soils when rain fall exceeds 50 in
[6] The scenario did not present rain fall and projected runoff, just HQ's so the worst case is listed.
NA= Data is Not Available

Table 8. Summary of Exposure Assessment[1] and Risk Characterization for Sensitive Terrestrial Plants from Drift After Backpack Directed Foliar Application.[2]

Chemical	Aminopyralid		Chlorsulfuron		Clopyralid		Glyphosate		Imazapyr		Sulfometuron Methyl		Triclopyr (TEA)		Triclopyr (BEE)	
Toxicity value (lb/ac)	.0002		.0000088		.0005		.0013		.000064		.00024		.0028		.0028	
Feet	**EA**	**HQ[2]**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**	**EA**	**HQ**
0	*0.11*	**550**	*0.048*	**5,455**	*0.14*	**280**	*2*	**1,538**	*0.33*	**5,156**	*0.14*	**5,833**	*2*	**714**	*2*	**714**
25	*0.000915*	**5**	*0.00168*	**191**	*0.001165*	**2**	*0.01664*	**13**	*0.002746*	**43**	*0.001165*	**49**	*0.01664*	**6**	*0.01664*	**6**
50	*0.000476*	**2**	*0.000850*	**97**	*0.000606*	**1.2**	*0.00866*	**7**	*0.001429*	**22**	*0.000606*	**25**	*0.00866*	**3**	*0.00866*	**3**
100	*0.000265*	**1.3**	*0.000455*	**52**	*0.000337*	0.7	*0.00482*	**4**	*0.000795*	**12**	*0.000337*	**14**	*0.00482*	**1.7**	*0.00482*	**1.7**
300	*0.000104*	0.5	*0.000168*	**19**	*0.000132*	0.3	*0.001882*	**1.4**	*0.000311*	**5**	*0.000132*	**5**	*0.001882*	0.7	*0.001882*	0.7
500	*0.000064*	0.3	*0.000100*	**11**	*0.000082*	0.2	*0.001158*	0.9	*0.000191*	**3**	*0.000081*	**3**	*0.001158*	0.4	*0.001158*	0.4
900	*0.000034*	0.2	*0.000052*	**6**	*0.000044*	9E-02	*0.000624*	0.5	*0.000103*	**1.6**	*0.000044*	**1.8**	*0.000624*	0.2	*0.000624*	0.2

[1] EA (Exposure Assessment): The equivalent rate of drift as a percent of the original application rate; measured in lbs/ac.
[2] Data analysis is generated from Herbicide Specific work sheets developed by the Syracuse Environmental Research Associates for the USFS.

Special-status plant species may also be indirectly impacted through competition from invasive plants. The implementation of the VIWMP would potentially increase establishment and spread of invasive weeds in certain areas where native cover is reduced (e.g., underneath transmission lines); however the plan is designed to manage populations of invasive species and implement measures to reduce their spread as outlined in Section 5 of the VIWMP and described below in Section 7.2. Preparing and implementing the VIWMP is one of the environmental measures in the UARP FERC License to protect native species.

Finally special-status species may be indirectly impacted by mechanical treatment if the timing of treatment is not considered; implementation of the various protection measures outlined in Section 5 of the VIWMP including avoidance of mechanical weed trimming in areas where invasive plants have already set seed will ensure that seeds are not spread during such treatments.

5.2.1 *Aminopyralid (Milestone)*

There is some risk to sensitive non-target plants associated with the application of Milestone. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Milestone that exceed the level of concern. Applications made at sites with high clay content soils where rainfall exceeds 15 in per year can produce runoff with a HQ that exceeds a level of concern (Table 7). This evaluation scenario assumes broadcast applications to an entire area; however, application of this herbicide in the project will be limited to spot foliar and limited broadcast treatments. This herbicide does have pre-emergent activity; however, the intent is to apply it primarily as a post-emergent herbicide and rely on the soil activity to inhibit subsequent germination and growth within the area treated. Treatments will not attempt to eliminate all vegetation. Risk is greatest on clay soils, which are not typically found in the Project Area, and are significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

The risk from drift will be further reduced considering the primary use of Milestone will be the selective control of thistle and broom, application will be limited to spot foliar and limited broadcast foliar treatments and drift management protection measures as described in Section 5 of the VIWMP will also be employed. In addition, ENF Sensitive species will be flagged and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP.

5.2.2 *Chlorsulfuron (Telar XP®)*

There is some risk to sensitive non-target plants associated with the application of Telar. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Telar that exceed the level of concern which would impact seedling germination. Applications made at sites with high clay content soils where rainfall exceeds 15 in per year can produce runoff with a HQ that exceeds a level of concern (Table 7). The primary use of Telar will be for vegetation control in substations and switch yards and use on canal berms were runoff will be limited due to site engineering/conditions. Risk is greatest on clay soils, which are not typically found in the Project Area, and is significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Chlorsulfuron off target as far away as 900 ft (Table 8). The risk from drift will be reduced considering the applications will be made with a backpack sprayer except for switch yards and other areas requiring bare ground condition and drift management protection measures as described in Section 5 of the VIWMP will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.3 *Clopyralid*

There is some risk to sensitive non-target plants associated with the application of Clopyralid. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Clopyralid that exceed the level of concern. A HQ of 1.2 was established for terrestrial plants that could be impacted as a result of runoff (Table 7). This involves the most sensitive species during a precipitation event approaching 100 in on clay soils. Risk is greatest on clay soils, which are not typically found in the Project Area, and is significantly reduced in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff. Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Clopyralid up to 50 ft from an application (Table 8);.) The risk from drift will be reduced considering the applications will be made with a drift reduction methods on back pack sprayers and drift management protection measures as described in Section 5.2, Table 4 will be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.4 *Glyphosate*

Runoff is unlikely due the physical properties of Glyphosate, specifically its tendency to tightly bind to all soil types immediately following application (Table 7). However, drift is a concern with any post–emergent application (Table 8). Drift scenarios for this assessment represent an extreme case, HQs exceed a level of concern to 300 ft. At 300 ft the equivalent rate is .0018 lbs/ac which is less than .1% of the prescribed rate. Low pressure backpack applications proposed in the VIWMP will be such that drift potential will be reduced significantly. This will be accomplished by the use of directed foliar applications and drift reduction methods as described in Section 5.2 of the VIWMP which will minimize contamination of non-target vegetation. Other aspects of the application process will ensure that non-target, terrestrial plants will not be adversely affected by the use of Glyphosate include the resource protection measures outlined in Section 5 of the VIWMP regarding wind speed and weather. Finally, ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.5 *Imazapyr*

There is some risk to sensitive non-target plants associated with the application of Imazapyr. Runoff resulting from a rainfall event can expose sensitive non-target terrestrial plants to concentrations of Imazapyr that exceed the level of concern (Table 7). This can occur when considering the central and upper application exposure potential for sensitive plants and the upper most exposure potential for tolerant plants. Runoff is a function of application rate, nature of application and timing of application relative to rainfall. The risks associated with runoff will be reduced based on multiple factors. First, directed low volume foliar and low-volume basal treatments will be applied and no broadcast applications will be made. Second, the risks are reduced significantly in loamy or sandy soils, which are more common in the Project Area (SNEP 1996). Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying Imazapyr 900 ft from an application (Table 8). The scenarios analyzed consider a low boom mechanized application. However, no broadcast applications will be made; Imazapyr will be applied with directed low volume foliar and low-volume basal treatments and the protection measures as proposed in the VIWMP will minimize drift during the application of Imazapyr. ENF Sensitive species will be flagged for and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.6 *Sulfometuron methyl*

There is some risk to sensitive non-target plants associated with the application of Sulfometuron methyl. Sulfometuron methyl is soil-active and persistent; some scenarios project that runoff of sulfometuron methyl is possible and could result in concentrations that will exceed the HQ and potentially impact seedling germination. These scenarios occur when rainfall amounts exceed 15 in and clay soils are present and HQs for runoff on clay were well above a level of concern when rainfall amounts approached 20 in

(Table 7). Runoff potential is reduced significantly on loam and sandy soils which are more common in the Project Area (SNEP 1996). Soil movement and subsequent runoff will be mitigated by site engineering given that Sulfometuron methyl will only be applied to engineered compacted surfaces within substations and switchyards. Furthermore, field studies determined that in practice sulfometuron methyl is relatively immobile as pH, loam and sand and high organic matter reduce runoff. This result was observed even when application rates were three times those that are prescribed for the plan (Odell, 1998). Therefore, in practice, impacts to non-target terrestrial vegetation are expected to be low to non-existent.

Risk assessments for drift suggest a potentially significant impact to non-target sensitive species from drift carrying sulfometuron methyl to a distance greater than 900 ft for sensitive plants and 100 ft for tolerant species (Table 8). The risk from drift will be greatly reduced considering this application will be used for switchyards, parking and access roads where bare ground is required and all other applications for this project will be made with low-pressure, low-volume backpack applicators. Drift management protection measures as described in Section 5 of the VIWMP will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIMWP; these actions will further protect special-status species during the application of this herbicide.

5.2.7 *Triclopyr (TEA)*

There is some risk to sensitive non-target plants associated with the application of Trilopyr (TEA; Table 7). Impacts due to runoff could be significant and are based on considerations for annual rainfall, application timing and application surface. Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

There is also potential for Triclopyr (TEA) drift to adversely impact sensitive species; drift Scenarios produce HQ>1 up to 100 ft from application target (Table 8Drift will be mitigated using low-pressure, low-volume backpack sprayer applications and drift management protection measures as described in Section 5.2, Table 6 will also be employed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.8 *Triclopyr (BEE) –Garlon 4*

Impacts due to runoff could be significant and are based on considerations for time of application, rainfall amount and application method; runoff is a concern where the highest levels of exposure and application rates are considered (Table 7). It is deemed unlikely that a scenario would exist where runoff would impact non-target sensitive species due to prevalent soil types (i.e., sandy loams) and proposed application method (basal).Proposed application timing (Table 2 of the VIWMP) as well as implementation of resource protection measures related to weather outlined in Section 5 of the VIWMP will further reduce potential for runoff.

There is potential for Triclopyr (BEE) drift to adversely impact sensitive species that are within 100 ft of the application site (Table 8). In general, tolerant species would be impacted as a result of a direct spray only. However, the scenario considered for Triclopyr (BEE) is per foliar applications. The proposed VIWMP plan application for Garlon 4 is a basal application with a nozzle pressure below 20 psi, directed at the lower 12-18 in of the stem, with nozzle distance no more than 3 in from the stem . Based on extensive field experience from licensed Pest Control Advisor, this will minimize drift and limit off-target movement to less than ten ft. Furthermore, the potential for volatility will be mitigated as this application will be made later in the season when temperature is cooler and strict guidelines on the PCR that address volatility mitigation will be followed. ENF Sensitive species will be flagged for avoidance and herbicide exclusion buffers will be established as described in Section 5 of the VIWMP; these actions will further protect special-status species during the application of this herbicide.

5.2.9 *Triclopyr (TCP)*

Assessments are not available for terrestrial plants regarding Triclopyr TCP as it is a metabolite that has no activity on plants.

5.2.10 *Colorants and Surfactants*

Additives in the form of colorants (or dye) and surfactants will be added to each herbicide mixture depending upon the herbicide(s), site conditions and Best Management Practices. The colorant or dye will determine location of coverage to ensure proper coverage of target species and help reduce the risk to non-target species. Surfactants and colorants alone are not phtyto active to the point they would increase the risk to non-target sensitive plants beyond the potential risks for each herbicide as analyzed above. Furthermore, there are no documented instances of synergistic effects (Bakke 2007).

6 DETERMINATION OF EFFECTS

6.1 Federally Listed Species

Implementation of the VIWMP will have no effect on *Packera layneae* given that the species is currently not documented and potential habitat does not occur in the Project Area. If *Packera layneae* were documented on NFS lands in the project areaConsultation with U.S. Fish and Wildlife Service may be required.

6.2 ENF Sensitive Species

Implementation of the VIWMP would not affect for ENF Sensitive species decribed in Table 9. There are no known occurrences or suitable habitat within the project area.

Implementation of the VIWMP may impact individual plants but will not likely contribute to a trend towards federal listing for the following ENF Senstive species as described in Table 9.

Table 9. ENF Sensitive species potentially affected by implementation of the VIWMP.

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Vascular			
Allium tribracteatum	three-bracted onion	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium lunaria	common moonwort	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium montanum	western goblin	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Botrychium pendunculosum	stalked moonwort	–/–/FSS/2B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
			towards federal listing
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	No Effect; outside of the Project Area elevation range
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	No Effect; outside of the Project Area elevation range
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Horkelia parryi	Parry's horkelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lewisia longipetala	Long-petaled lewisia	–/–/FSS/1B.3	No Effect; outside of the Project Area elevation range
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Pinus albicaulis	white bark pine	–/–/FSS/–	No; outside of the Project Area elevation range
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	May affect individuals but not likely to affect species

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
			viability or lead to a trend towards federal listing
Bryophytes			
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

Scientific name	Common name	Status[1] Federal/State/ USFS/CRPR	Determination
Fungi			
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing
Lichens			
Peltigera gowardii	western waterfan lichen	–/–/FSS/4.2	May affect individuals but not likely to affect species viability or lead to a trend towards federal listing

[1] Status:
Federal
FT Federally listed as threatened
– No federal status
State
CR California State listed as rare
– No state status
USFS
FSS USFS Sensitive
FSW USFS Watch List
California Rare Plant Rank (formerly known as CNPS Lists)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list
CNPS Threat Ranks:
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

7 INVASIVE PLANT RISK ASSESSMENT

The Sierra Nevada Forest Plan Amendment ROD (January 2004) contains standards and guidelines aimed at reducing the spread of noxious weeds in Sierra Nevada National Forests. One of these standards requires a noxious weed risk assessment for all NEPA analyses. The purpose of the risk assessment is to identify vectors and changes in habitat that might favor the introduction of new invasive plants into a proposed project area, or might further spread invasive plants that already exist within the project boundaries; then to apply the appropriate invasive plant prevention practices to reduce the threat.

7.1 Invasive Plants Occurrences Within the Project Area

ENF provided a list of target invasive plants (nonnative plants of management concern in the ENF) and infestation data (known invasive plant occurrences) for the Project Area

(Appendix E). The list includes nonnative invasive plant species in the following ENF categories:

- Group 1 (Eradicate): highly invasive species known to occur in the ENF that are targeted for inventory, control and eradication;
- Group 2 (Control): established or widespread species known to occur in the ENF which are targeted for inventory and annual treatment of a portion of known infestations;
- Group 3 (Control): established or widespread species known to occur in the ENF which are targeted for inventory and treatment of isolated leading edge infestations or where concurrent with higher priority infestations.
- Group 4 (Manage through education and prevention): species well established across the ENF or have minor economic or ecological impacts that are targeted for appropriate prevention and education measures to limit further spread; and
- Potential Invasives: species not yet found in the ENF but that will be targeted for eradication or control if located.

Information on known invasive plant infestations (using a combination of DTA 2004, Atkins 2016, and ENF 2017c spatial data) was compiled and plotted on a GIS map. Twenty target invasive plant species have been documented (Table 10).

Table 10. Invasive Plants Documented in the Project Area.

Scientific name [Hickman 1993]	Common name	Cal-IPC[1]	Occurrence			Documentation Source
			Number of occurrences	Approximate total number of plants	Sum of acres	
Group 1 (Eradicate)						
Aegilops triuncialis	barbed goat grass	High	23	6,734	74.9	Atkins 2016, DTA 2004, ENF 2017b
Centaurea stoebe subsp. *micranthos*	spotted knapweed	High	1	6	<1	ENF 2017b
Lepidium latifolium	perennial pepperweed	High	3	64	<1	Atkins 2016, ENF 2017b
Group 2 (Control)						
Carduus pycnocephalus subsp. *pycnocephalus*	Italian thistle	Moderate	2	2	<1	Atkins 2016, ENF 2017b
Centaurea melitensis	tocalote	Moderate	3	505	<1	Atkins 2016, ENF 2017b
Centaurea solstitialis	yellow star-thistle	High	21	25,708	41.3	Atkins 2016, DTA 2004, ENF 2017b
Chondrilla juncea	skeleton weed	Moderate	64	29,115	172.1	Atkins 2016, DTA 2004, ENF 2017b

Scientific name	Common name	Cal-	Occurrence			Documentation
Cytisus scoparius	Scotch broom	High	22	1,117	19.2	Atkins 2016, DTA 2004, ENF 2017b
Elymus caput-medusae [*Taeniatherum caput-medusae*]	medusa head	High	8	2,174	32.4	Atkins 2016, ENF 2017b
Group 3 (Control)						
Dysphania botrys [*Chenopodium botrys*]	Jerusalem oak	None	14	2,031	68.7	Atkins 2016, ENF 2017b
Brassica nigra	black mustard	Moderate	13	260	17.3	Atkins 2016
Bromus tectorum	cheat grass, downy chess	High	127	770,880	279.5	Atkins 2016, DTA 2004, ENF 2017b
Cirsium vulgare	bull thistle	Moderate	119	6,833	240.0	Atkins 2016, ENF 2017b
Hypericum perforatum subsp. *perforatum*	Klamathweed	Moderate	141	81,646	282.8	Atkins 2016, ENF 2017b
Leucanthemum vulgare	ox-eye daisy	Moderate	2	10	<1	Atkins 2016, ENF 2017b
Melilotus officinalis	yellow sweetclover	None	78	646,719	198.1	Atkins 2016, ENF 2017b
Rubus armeniacus [*Rubus discolor*]	Himalayan blackberry	High	34	2,214	28.6	Atkins 2016
Group 4 (Manage)						
Bromus diandrus	ripgut brome	Moderate	*	*	*	DTA 2004
Potential Invasives						
Tanacetum vulgare	common tansy	Moderate	2	*	<1	Atkins 2016, ENF 2017b

[1] Cal-IPC:
High—Species having severe ecological impacts on physical processes, plant and animal communities, and vegetation structure.
Moderate—Species having substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure.
[2] Insufficient data in data sources.

7.1.1 *Aegilops triuncialis (barbed goatgrass)*

Aegilops triuncialis (barbed goatgrass) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to Mediterranean Europe and western Asia, it is found throughout much of northern and central California, from the Coast Ranges to the Sierra Nevada. *Aegilops triuncialis* grows at elevations from 0 to 1,000 m in disturbed sites, cultivated fields, and roadsides (Baldwin et al. 2012), as well as disturbed and undisturbed grasslands (DiTomaso and Healy 2007). It flowers from May to July (Baldwin et al. 2012). Within the Project Area, 23 occurrences of *Aegilops triuncialis* were documented over approximately 74.9 acres (Atkins 2016, ENF 2017c).

7.1.2 *Brassica nigra (black mustard)*

Brassica nigra (black mustard) is an annual herb in the Brassicaceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is found throughout the California Floristic Province at elevations up to 1,500 m (Baldwin et al. 2012). It is common along roadsides and in disturbed areas, fields, and grasslands (DiTomaso and Healy 2007). *Brassica nigra* flowers from April to September (Baldwin et al. 2012). Within the Project Area, 13 occurrences of *Brassica nigra* were documented over approximately 17.3 acres (Atkins 2016).

7.1.3 *Bromus diandrus (ripgut brome)*

Bromus diandrus (ripgut brome) is an annual herb in the Poaceae family with a Cal-IPC rating of Moderate and ENF Group 4 rating. Native to Europe, it is found throughout California at elevations below 2,170 m. *Bromus diandrus* occupies open, generally disturbed areas, and blooms from February to July (Baldwin *et al*. 2012). Within the Project Area, one occurrences of *Bromus diandrus* was (DTA 2004).

7.1.4 *Bromus tectorum (cheat grass)*

Bromus tectorum (cheat grass) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 3 rating. Native to Eurasia, it is commonly found throughout California in open, disturbed areas at elevations below 3,400 m. *Bromus tectorum* blooms from May to August (Baldwin et al. 2012). Within the Project Area, 127 occurrences of *Bromus tectorum* were documented over approximately 279.5 acres (Atkins 2016, ENF 2017c).

7.1.5 *Carduus pycnocephalus subsp. pycnocephalus (Italian thistle)*

Carduus pycnocephalus subsp. *pycnocephalus* (Italian thistle) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to the Mediterranean, it is commonly found in much of western California, the Sacramento

Valley, and the Sierra Nevada foothills at elevations below 1,200 m. *Carduus pycnocephalus* subsp. *pycnocephalus* inhabits roadsides, pastures, and disturbed areas, and blooms from March to July (Baldwin et al. 2012). Within the Project Area, two occurrences of *Carduus pycnocephalus subsp. pycnocephalus* were documented over approximately 0.5 acre (Atkins 2016, ENF 2017c).

7.1.6 *Centaurea melitensis (tocalote)*

Centaurea melitensis (tocalote) is an annual herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to southern Europe, it is commonly found throughout the California Floristic Province and is uncommon in the Desert Province. *Centaurea melitensis* inhabits disturbed fields and open woodlands below 2,200 m and blooms from April to July (Baldwin et al. 2012). Within the Project Area, three occurrences of *Centaurea melitensis* were documented over approximately 0.2 acre (Atkins 2016, ENF 2017c).

7.1.7 *Centaurea solstitialis (yellow star-thistle)*

Centaurea solstitialis (yellow star-thistle) is a winter annual herb in the Asteraceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to southern Europe, it aggressively reproduces by seed. *Centaurea solstitialis* is common below 1,300 m throughout the California Floristic Province and Mojave Desert (Baldwin et al. 2012) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed sites such as roadsides and waste places (DiTomaso and Healy 2007). It flowers from May through October (Baldwin et al. 2012). Within the Project Area, 21 occurrences of *Centaurea solstitialis* were documented over approximately 41.3 acres (Atkins 2016, ENF 2017c).

7.1.8 *Centaurea stoebe subsp.micranthos (spotted knapweed)*

Centaurea stoebe subsp. *micranthos* (spotted knapweed) is a biennial to short-lived perennial herb in the Asteraceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to southeastern Europe, it aggressively reproduces by seed. *Centaurea stoebe subsp. micranthos* is common below 2,600 m (Baldwin et al. 2012) and can rapidly invade grassland, rangeland, open woodlands, fields, pastures, and open disturbed sites such as roadsides and waste places (DiTomaso and Healy 2007). It flowers from July through September (Baldwin et al. 2012). Within the Project Area, one occurrence of *Centaurea stoebe* subsp. *micranthos* was documented over approximately 0.9 acre (ENF 2017c).

7.1.9 *Chondrilla juncea (skeleton weed)*

Chondrilla juncea (skeleton weed) is a biennial or occasional perennial in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 2 rating. Native to Eurasia, the Mediterranean, and northwest Africa, it is found in California primarily in the Great

Valley and less commonly in the Cascade, North Coast, and South Coast ranges and San Francisco Bay at elevations up to 600 m. *Chondrilla juncea* inhabits pastures and disturbed places, and blooms from June to January (Baldwin et al. 2012). Within the Project Area, 64 occurrences of *Chondrilla juncea* were documented over approximately 172.1 acres (Atkins 2016, ENF 2017c).

7.1.10 *Cirsium vulgare (bull thistle)*

Cirsium vulgare (bull thistle) is a biennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Eurasia, it is commonly found throughout the California Floristic Province and Great Basin at elevations below 2,350 m. *Cirsium vulgare* inhabits disturbed areas and blooms from May to October (Baldwin et al. 2012). Within the Project Area, 119 occurrences of *Cirsium vulgare* were documented over approximately 240 acres (Atkins 2016, ENF 2017c).

7.1.11 *Cytisus scoparius (Scotch broom)*

Cytisus scoparius (Scotch broom) is a shrub in the Fabaceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to southern Europe and northern Africa, this shrub can grow up to 2.5 m tall. In California it is commonly found below 1,000 meters in Northwestern California, north and central Sierra Nevada foothills, Great Valley, San Francisco Bay Area, South Coast, and San Bernardino Mountains. *Cytisus scoparius* inhabits disturbed places and blooms from April through July (Baldwin et al. 2012). Within the Project Area, 22 occurrences of *Cytisus scoparius* were documented over approximately 19.2 acres (Atkins 2016, ENF 2017c).

7.1.12 *Dysphania botrys (Jerusalem oak)*

Dysphania botrys (Jerusalem oak) is an annual herb in the Chenopodiaceae family with an ENF Group 3 rating. Native to Europe and Asia, it is found throughout California at elevations below 2,100 m. *Dysphania botrys* inhabits disturbed areas and blooms from June to October (Baldwin et al. 2012). Within the Project Area, 14 occurrences of *Dysphania botrys* were documented over approximately 68.7 acres (Atkins 2016, ENF 2017c).

7.1.13 *Elymus caput-medusae (medusa head)*

Elymus caput-medusae (medusa head) is an annual herb in the Poaceae family with a Cal-IPC rating of High and ENF Group 2 rating. Native to Eurasia, in California it is found in the Klamath Range, North Coast Range, Cascade Range, Sierra Nevada Foothills, Great Valley, South Coast Range, and the Modoc Plateau. *Elymus caput-medusae* inhabits disturbed areas below 2,000 m and blooms from April to July (Baldwin et al. 2012). Within the Project Area, eight occurrences of *Elymus caput-medusae* were documented over approximately 32.4 acres (Atkins 2016, ENF 2017c).

7.1.14 *Hypericum perforatum subsp. perforatum (Klamathweed)*

Hypericum perforatum subsp. *perforatum* (Klamathweed) is a perennial herb in the Hypericaceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is commonly found in Northwestern California, the Cascade Range, north and central Sierra Nevada, and the Sacramento Valley, with limited distribution elsewhere in the California Floristic Province. *Hypericum perforatum* subsp. *perforatum* inhabits open, disturbed areas at elevations from six to 1,980 m, and blooms from May to August (Baldwin et al. 2012). Within the Project Area, 141 occurrences of *Hypericum perforatum subsp. perforatum* were documented over approximately 282.8 acres (Atkins 2016, ENF 2017c).

7.1.15 *Lepidium latifolium (perennial pepperweed)*

Lepidium latifolium (perennial pepperweed) is a rhizomatous, perennial herb in the Brassicaceae family with a Cal-IPC rating of High and ENF Group 1 rating. Native to Eurasia, it is found throughout California with the exception of the Klamath Range and the Desert Province. *Lepidium latifolium* is commonly found in pastures, disturbed areas, fields, grasslands, saline meadows, streambanks, sagebrush scrub, pinyon/juniper woodlands, and edges of marshes. It grows at elevations below 2,500 m and blooms from June to September (Baldwin et al. 2012). Within the Project Area, three occurrences of *Lepidium latifolium* were documented over approximately .04 acre (Atkins 2016, ENF 2017c).

7.1.16 *Leucanthemum vulgare (ox-eye daisy)*

Leucanthemum vulgare (ox-eye daisy) is a rhizomatous, perennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Group 3 rating. Native to Europe, it is widely naturalized in the North Coast, Klamath Range, North Coast Range, Cascade Range, north and central Sierra Nevada, Sacramento Valley, Central Coast, San Francisco Bay, Peninsular Range, and the Modoc Plateau. *Leucanthemum vulgare* inhabits disturbed areas, and meadows and seeps below 2,600 m, and blooms from June to August (Baldwin et al. 2012). Within the Project Area, two occurrences of *Leucanthemum vulgare* were documented over approximately 0.3 acre (Atkins 2016, ENF 2017c).

7.1.17 *Melilotus officinalis (yellow sweetclover)*

Melilotus officinalis (yellow sweetclover) is an annual or occasionally biennial herb in the Fabaceae family with and ENF Group 3 rating. Native to Eurasia, it is found throughout California at elevations below 2,300 m. *Melilotus officinalis* inhabits open fields and disturbed sites, and blooms from May to August (Baldwin et al. 2012). Within the Project Area, 78 occurrences of *Melilotus officinalis* were documented over approximately 198.1 acres (Atkins 2016, ENF 2017c).

7.1.18 *Rubus armeniacus (Himalayan blackberry)*

Rubus armeniacus (Himalayan blackberry) is a shrub in the Rosaceae family with a Cal-IPC rating of High and ENF Group 3 rating. Native to Eurasia, this climbing shrub can grow up to three meters tall. Common below 1,600 m throughout the California Floristic Province, habitat types include disturbed moist areas such as roadsides, fence rows, fields, and canal and ditch banks, but also natural riparian areas (Baldwin et al. 2012, DiTomaso and Healy 2007). *Rubus armeniacus* blooms from March through June (Baldwin et al. 2012). Within the Project Area, 34 occurrences of *Rubus armeniacus* were documented over approximately 28.6 acres (Atkins 2016).

7.1.19 *Tanacetum vulgare (common tansy)*

Tanacetum vulgare (commona tansy) is a perennial herb in the Asteraceae family with a Cal-IPC rating of Moderate and ENF Potential Invasives rating. Native to Europe, it occurs in disturbed areas below 2,000 m. *Tanacetum vulgare* blooms from June through August (Baldwin et al. 2012). Within the Project Area, two occurrences of *Tanacetum vulgare* were documented over approximately 0.5 acre (Atkins 2016, ENF 2017c).

7.2 Invasive Weed Prevention Measures

The entire list of protection measures designed for terrestrial and human resources is provided in Section 5 of the VIWMP. The following are the specific measures outlined to address invasive weed prevention:

- **PM-12:** Annual effectiveness monitoring (see Section 3.2) will include monitoring of invasive weed infestations that have been treated. During the annual monitoring of facilities and ROWs, SMUD will record whether past treatments have been effective on invasive weeds and whether additional treatments are needed.
- **PM-13**: New populations of invasive weeds will be inventoried and mapped during regularly described monitoring, and will be subsequently incorporated into the scheduled annual treatment.
- **PM-14:** Control methods will be determined by species, location, and season to facilitate the control of invasive/noxious weeds, as part of the annual maintenance work.
- **PM-15:** Management of invasive weeds will follow the management guidelines identified by the ENF and other stakeholders.
- **PM-16:** IVM activities will avoid, whenever possible, creating environmental conditions that promote weed germination and establishment, such as unnecessary soil disturbance or removal of shade and native vegetation or topsoil.
- **PM-17:** IVM shall be staged and begun in non-infested areas and then will move to infested areas.

- **PM-18:** Contractors and other staff will be required to clean vehicles and equipment prior to working on the National Forest; when moving from an infested unit to a weed-free unit, vehicles and equipment will be inspected. Vehicles will be washed by contractor at their business or at SMUD's Fresh Pond facility.
- **PM-19:** Areas in which ground-disturbing activity has occurred, and in which there is the potential to introduce invasive weeds, will be monitored for 3 years.
- **PM-20:** Weed-free materials, including certified weed-free straw or mulch, will be used wherever possible for erosion control, as these materials are available, with the county of origin stating the material was inspected. Local stockpiles and materials will be kept weed free with regular treatment.
- **PM-21:** Lay-down and staging areas will be designated outside of areas infested with weeds, or the sites will be treated prior to work.
- **PM-22:** Facility sites will be maintained to limit the introduction and spread of invasive plants; heavily used facilities will be regularly treated to prevent the spread of weeds.
- **PM-23:** Mechanical weed trimming will not be used to manage occurrences of listed invasive weeds if those weeds have already set seeds.
- **PM-24**: The USFS botanist will approve seed mixes used for erosion control or restoration.

7.3 Risk Assessment

Table 9 is adapted from Appendix L of the Draft Environmental Impact Report for the Sierra Nevada Forest Plan Amendment.

Table 9. Invasive Plant Risk Assessment Worksheet

Factors to consider	Components	Conditions	Risk Level
Invasive Plant Spread Factors not Connected to Proposed Action (Pre-Existing Circumstances)			
1. Inventory	Is there an adequate site-specific map showing acres by weed species and estimating number of infestations and acres? ***Completed survey of site.***	**Yes**	**Continue with risk assessment**
		No	Complete inventory first
2. Known noxious weeds	Number of A, B, or C rated weeds species in project area. *ENF has a new Priority 1-4 system.* ***Species documented within the Project Area are listed in Section 7.1, Table 10; there are a total of three Group 1 and six Group 2 species which are the highest priority for inventory and control.***	None present or adjacent	Prevention high priority, no control necessary
		Only low priority species present	Prevention high priority, control low priority.
		High priority species present	**Incoming prevention lower priority, but high priority to prevent weed spread within and from project area.**
3. Habitat vulnerability	Previous disturbance, plant species composition, soil cover, shade, soil type,	Open habitat or high previous disturbance	High current vulnerability to

Factors to consider	Components	Conditions	Risk Level
	aspect, moisture. ***Portions of the Project Area are heavily maintained (e.g., transmission lines, power houses), other areas moderately maintained (e.g., roads) and large portions of the Project Area are minimally maintained (perimeters of reservoirs, uplands) and therefore disturbance factors are variable.***		weed invasion
		Moderate cover, moderate previous disturbance.	**Moderate current vulnerability**
		High cover, mostly native plant species, low disturbance	Low current vulnerability
4. Vectors unrelated to proposed project	Existing roads and trails, traffic use, livestock, wildlife migration, wind patterns, drainage flow direction, etc. ***Level of public use is unknown but presumed to be moderate due to roads.***	Abundant vectors	High current vulnerability
		Moderate current vectors	**Moderate current vulnerability**
		Few current vectors	Low current vulnerability
Invasive Plant Spread Factors Related to the Proposed Action			
5. Habitat alteration expected as a result of the project	Logging prescriptions, road construction, fuels prescriptions, change in grazing management or recreation use, intensity or extent of disturbance. ***New ground disturbance presumed low-moderate; proposed action–including implementation of the various protection measures outlined in Section 7.2 above –is designed to maintain a desirable environmental condition that is consistent with the safe and effective operation and maintenance of UARP features. These desired conditions entail reducing cover of native vegetation in and around UARP features, increasing the long-term susceptibility of the project area to invasive plant establishment and spread.***	High ground disturbance, canopy and duff removal	High risk
		Moderate disturbance, canopy and duff removal	**Moderate risk**
		Low disturbance, minimal duff removal, shade retained	Low risk
6. Increased vectors as a result of project implementation	Road construction, facility construction, and amount of project related traffic plus personnel, tools, and materials such as mulch brought into the project. ***Project will only minimally increase the traffic to the site due to periodic treatment and monitoring.***	Road or facility construction	High risk
		Temporary roads, short-term traffic increase	Moderate risk
		No access improvement, minimal project-related traffic increase	**Low risk**
7. Mitigation measures	Prevention (equipment washing, weed-free materials, monitoring), control of existing infestations, effective cultural practices (maintain shade, minimize ground disturbance, design project to reduce weed flow). ***Protection measures described in Section 7.2 above.***	No mitigation measures implemented	Higher risk
		Some mitigation measures implemented	Moderately reduced risk
		Implement all relevant mitigation measures	**Greatly reduced risk**
Overall Assessment of Risk for Project			
8. Anticipated weed response to proposed action	Tally "high risk" responses in previous sections, consider mitigation if it is adopted as part of the proposed action and incorporated into the decision document.	Numerous high risk factors	High potential for significant increase of weed spread as a result of project implementation.
		Few high risk factors	**Moderate potential for spread**

Factors to consider	Components	Conditions	Risk Level
		No high risk factors	Low potential for weed spread

7.4 Determination of Effects

The overall number and size of existing weed populations is moderate but there are a number of high priority infestations known in the project area that should be prioritized for treatment before they spread further in the project area. Additionally project activities are expected to increase the risk of invasive plant establishment and spread by treating incompatible native vegetation that currently interferes with operation of UARP features. With the expected reduction/alteration of native plant cover there is a greater risk of existing and new invasive species spreading in the project area. However, these risks are expected to be reduced by resource protection measures included in the project to prevent invasive plant introduction and spread, as well as the annual monitoring/treatment to control spread of invasive weeds. Therefore, the overall risk for the spread of invasive weeds as a result of project activities is **moderate** considering the resource protection measures described Section 7.2 above.

8 LITERATURE CITED

Atkins. 2016. Botanical Surveys Performed in Support of the Vegetation and Invasive Weed Management Plan. Prepared for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

Bakke, D. 2007. Analysis of issues Surrounding the Use of Spray Adjuvants with Herbicides. Original 2002, revision 2007. US Forest Service. http://www.fs.fed.us/r6/invasiveplant-eis

Baldwin, B. G., D. H. Goldman, D. J. Keil, R. Patterson, T. J. Rosatti and D. H. Wilken, editors. 2012. The Jepson manual: vascular plants of California, second edition. University of California Press, Berkeley.

CDFW (California Department of Fish and Wildlife). 2016a. Special vascular plants, bryophytes, and lichens list. Quarterly publication. Prepared by CDFW, Sacramento, California.

CDFW. 2017b. California Natural Diversity Database. RareFind5. Website. https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data [Access January 2017.] Prepared by California Department of Fish and Game, Natural Heritage Division, Sacramento, California.

CNPS (California Native Plant Society), Rare Plant Program. 2017. Inventory of Rare and Endangered Plants (online edition, version 8-02). California Native Plant Society, Sacramento, California. Website. http://www.rareplants.cnps.org [Accessed January 2017].

DiTomaso, J.M., E.A. Healy. 2007. Weeds of California and other western states. UCANR Publications.

DTA (Divine Tarbell and Associates). 2004. Special-status plants and invasive/noxious weeds technical report. Prepared by DTA, Sacramento, California and Stillwater Sciences, Davis, California for Sacramento Municipal Utility District, Sacramento, California and Pacific Gas and Electric Company, San Francisco, California.

ENF (Eldorado National Forest). 2016. Threatened, endangered, and sensitive plants known to occur or with suitable habitat on the ENF, May 3, 2016.

ENF. 2017a. Eldorado National Forest watch list species, January 26, 2017.

ENF. 2017b. Eldorado National Forest TESP Geodatabase, 2017.

ENF. 2017C. Eldorado National Forest Invasive Plant Geodatabase, 2017

Hickman, J. C., editor. 1993. The Jepson manual: higher plants of California. University of California Press, Berkeley, California.

Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A Guide to wildlife habitats of California. State of California Resources Agency, Department of Fish and Game, Sacramento, California. http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp

Odell, Shelley. 1998. Environmetal Fate of Sulfometuron-Methyl; Environmental Monitoring and Pest Management Department of Pesticide Regulation, Sacramento, CA95814 1999 Dell

SMUD (Sacramento Municipal Utility District) et al. 2007. Relicensing Settlement Agreement for the Upper American River Project and Chili Bar Hydroelectric Project. Sacramento Municipal Utility District, Sacramento, CA.

SMUD. 2008. Final Historic Properties Management Plan, Version 2. October.

SNEP (Sierra Nevada Ecosystem Project). 1996. Final report to Congress. Sierra Nevada Ecosystems. Vol 1. Ch 1. http://ceres.ca.gov/snep/pubs/web/PDF/v1_ch01.pdf; USGS DDS-43, Sierra Nevada Ecosystems

USFS (U.S. Department of Agriculture, Forest Service). 1989. Land and Resource Management Plan. Pacific Southwest Region. USDA Forest Service.

USFS. 2004. Sierra Nevada Forest Plan Amendment, Final Supplemental Environmental Impact Statement. Record of Decision. Pacific Southwest Region. Vallejo, CA.

USFS. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a. April.

USFS. 2016. CALVEG Zone 3: North Sierra. Website. https://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/?cid=stelprdb5347192 [Accessed February 2017].

USFWS (U.S. Fish and Wildlife Service). 2009. Biological Opinion on the Issuance of a New License for the Upper American River Hydroelectric Project, FERC Project Number 2101, El Dorado County, California. Sacramento Fish and Wildlife Office.

USFWS. 2017. IPac information for planning and conservation. Website. http://ecos.fws.gov/ipac/ [Accessed 19 January 2017].

Appendices

Appendix A

Rare Natural Communities Documented in the Project Vicinity

Table A-1. Rare natural communities documented in the Project Vicinity.

Natural community (Holland 1986)	Source	Rank[1] (Global /State)	Elevation (m)	Habitat description[2]
Lava cap	ENF	-/-	1,200-1,463	Herb and grass dominated openings within the Upper Montane Chaparral formed on very rocky and volcanic soils eroded from Mehrten formation mudflow.
Fens	CNDDB	G2/S1.2	1,174–3,643	Peat-forming wetlands supported by nearly constant groundwater flow.[3]
Sphagnum Bog	CNDDB	G3/S1.2	300–1,820	In cold, highly acid, permanently waterlogged soils that are low in available nutrients. Dominated by a dense growth of low-growing, herbaceous perennials and low shrubs. The growing season is limited to summer at high elevations. Most flowering occurs in the first half of the growing season.

[1] Status:
Global Rank
G2 **Imperiled**: At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
G3 **Vulnerable**: At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
State Rank
S1 **Critically Imperiled:** Critically imperiled in the state because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S3 **Vulnerable:** Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
Additional Threat Ranks
0.2 Threatened
[2] Source: Holland (1986) unless otherwise noted.
[3] Bedford and Godwin 2003.

Appendix B

Special-status Plants Documented in the Project Vicinity

Table B-1. Special-status plants documented in the Project vicinity[1].

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Vascular Plants									
Allium sanbornii var. *congdonii*	Congdon's onion	–/–/FSW/4.3	CNPS	Alliaceae	perennial bulbiferous herb	April–July	300–990	Serpentinite or volcanic soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Allium sanbornii var. *sanbornii*	Sanborn's onion	–/–/FSW/4.2	CNPS	Alliaceae	perennial bulbiferous herb	May–September	260–1,510	Usually serpentinite or gravelly soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Alliium tribracteatum	three-bracted onion	–/–/FSS/1B.2	ENF	Alliaceae	perennial bulbiferous herb	April–August	1,100– 3,000	Volcanic soils, in lower and uppoer montane coniferous and chaparral forest	Yes; potential habitat in the Project Area.
Arabis rigidissima var. *demota*	Galena Creek rockcress	–/–/–/1B.2	CNPS, CNDDB	Brassicaceae	perennial herb	July–August	2,255–2,560	Rocky soils in broadleafed upland forestand upper montane coniferous forest	Yes; potential habitat in the Project Area.
Arctostaphylos mewukka subsp. *truei*	True's manzanita	–/–/–/4.2	CNPS	Ericaceae	perennial evergreen shrub	February–July	425–1,390	Sometimes roadside in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Arctostaphylos nissenana	Nissenan manzanita	–/–/FSS/1B.2	CNPS, CNDDB, ENF	Ericaceae	perennial evergreen shrub	February–March	450–1,100	Rocky soils in closed-cone coniferous forest and chaparral	Yes; potential habitat in the Project Area.
Artemisia tripartita subsp. *tripartita*	threetip sagebrush	–/–/–/2B.3	CNPS, CNDDB	Asteraceae	perennial shrub	August	2,200–2,600	Rocky or volcanic soils in openings in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Astragalus	Austin's	–/–/FSW/1B.3	CNPS,	Fabaceae	perennial	(May), July–	2,440–2,970	Rocky soils in alpine	No; outside

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
austiniae	astragalus		CNDDB, ENF		herb	September		boulder and rock field and subalpine coniferous forest	of the Project Area elevation range.
Astragalus whitneyi var. *lenophyllus*	woolly-leaved milk-vetch	–/–/FSW/4.3	CNPS	Fabaceae	perennial herb	July–August	2,135–3,050	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	Yes; potential habitat in the Project Area.
Balsamorhiza macrolepis var. *macrolepis*	big-scale balsamroot	–/–/FSS/1B.3	ENF	Asteraceae	perennial herb	March–June	90–1,555	Sometimes serpentinite soils in chaparral, cismontane woodland, and valley and foothill grasslands	Yes; potential habitat in the Project Area.
Boechera tularensis	Tulare rockcress	–/–/–/1B.3	CNPS, CNDDB	Brassicaceae	perennial herb	(May), June–July (August)	1,825–3,350	Rocky slopes and sometimes roadsides in subalpine coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Bolandra californica	Sierra bolandra	–/–/FSW/4.3	CNPS, ENF	Saxifragaceae	perennial herb	June–July	975–2,450	Mesic, rocky soils in lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium ascendens	upswept moonwort	–/–/FSS/2B.3	CNPS, CNDDB	Ophioglossaceae	perennial rhizomatous herb	July–August	1,115–2,700	Mesic soils in lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area.
Botrychium crenulatum	scalloped moonwort	–/–/FSS/2B.2	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	June–September	1,268–3,280	Bogs and fens, lower montane coniferous forest, meadows and seeps, freshwater marshes and swamps and upper montane coniferous forest	Yes; documented in the Project Area (CDFW 2017b).
Botrychium lunaria	Common	–/–/FSS/2B.3	ENF	Ophioglossa	perennial	August	1,980–3,400	Meadows and seeps in	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	moonwort			ceae	rhizomatou s herb			subalpine coniferous forest and upper montane coniferous forest	potential habitat in the Project Area.
Botrychium minganense	Mingan moonwort	–/–/FSS/2B.2	CNPS, CNDD B, ENF	Ophioglossa ceae	perennial rhizomatou s herb	July–September	1,455–2,180	Mesic soila in Bogs and fens, lower montane coniferous forest, edges of meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium montanum	western goblin	–/–/FSS/2B.1	CNPS, CNDD B, ENF	Ophioglossa ceae	perennial rhizomatou s herb	July–September	1,465–2,180	Mesic areas in lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium paradoxum	paradox moonwort	–/–/FSS/2B.1	CNPS, ENF	Ophioglossa ceae	perennial rhizomatou s herb	August	1,740–4,200	Limestone and marble alpine boulder and rock fields and moist areas of Upper montane coniferous forest	Yes; potential habitat in the Project Area.
Botrychium simplex	least moonwort	–/–/FSW/2B.3	ENF	Ophioglossa ceae	perennial rhizomatou s herb	May–September	1,500–3,200	In saturated moss or sedge mats around hard water seeps and streamlets.	Yes; documented in the Project Area (ENF 2017b).
Brasenia schreberi	watershield	–/–/–/2B.3	CNPS, CNDD B	Cabombacea e	perennial rhizomatou s herb	June–September	30–2,200	Freshwater marshes and swamps	Yes; potential habitat in the Project Area.
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/–/FSS/1B.2	CNPS, CNDD B, ENF	Liliaceae	perennial bulbiferous herb	May–July	305–1,800	Josephine silt loam and volcanic soils in lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016,

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									CDFW 2017b & ENF 2017b).
Calystegia vanzuukiae	Van Zuuk's morning-glory	–/–/FSW/1B.3	CNPS, CNDDB, ENF	Convolvulaceae	perennial rhizomatous herb	May–August	500–1,180	Gabbro, serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Carex cyrtostachya	Sierra arching sedge	–/–/FSW/1B.2	CNPS, CNDDB, ENF	Cyperaceae	perennial herb	May–August	610–1,360	Mesic areas in lower montane coniferous forest, meadows and seeps, marshes and swamps, and the margins of riparian forests	Yes; potential habitat in the Project Area.
Carex davyi	Davy's sedge	–/–/FSW/1B.3	CNPS, CNDDB, ENF	Cyperaceae	perennial herb	May–August	1,500–3,200	Subalpine coniferous forest, upper montane coniferous forest	Yes; potential habitat in the Project Area.
Carex lasiocarpa	woolly-fruited sedge	–/–/–/2B.3	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	June–July	1,700–2,100	Bogs and fens and freshwater marshes and swamps along lake margins	Yes; potential habitat in the Project Area.
Carex limosa	mud sedge	–/–/–/2B.2	CNPS, CNDDB	Cyperaceae	perennial rhizomatous herb	June–August	1,200–2,700	Bogs and fens, lower montane coniferous forest, meadows and seeps, marshes and swamps, upper montane coniferous forest	Yes; potential habitat in the Project Area.
Carex tahoensis	Tahoe sedge	–/–/–/4.3	CNPS	Cyperaceae	perennial rhizomatous herb	July–August	2,835–3,810	Alpine boulder and rock field and rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range.
Ceanothus fresnensis	Fresno ceanothus	–/–/FSW/4.3	CNPS, ENF	Rhamnaceae	perennial evergreen shrub	May–July	900–2,103	Openings in cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									(ENF 2017b).
Chaenactis douglasii var. *alpina*	alpine dusty maidens	–/–/FSW/2B.3	CNPS, CNDDB	Asteraceae	perennial herb	July–September	2,865–3,400	Granitic soils in alpine boulder and rock field	No; outside of the Project Area elevation range.
Chlorogalum grandiflorum	Red Hills soaproot	–/–/FSW/1B.2	CNPS, CNDDB, ENF	Agavaceae	perennial bulbiferous herb	May–June	245–1,690	Serpentinite, gabbroic and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b).
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	–/–/FSW/4.2	CNPS, CNDDB, ENF	Onagraceae	annual herb	May–July	75–915	Often roadcuts in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Clarkia virgata	Sierra clarkia	–/–/FSW/4.3	CNPS, ENF	Onagraceae	annual herb	May–August	400–1,615	Cismontane woodland and lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Claytonia megarhiza	fell-fields claytonia	–/–/FSW/2B.3	CNPS	Montiaceae	perennial herb	July–September	2,600–3,532	In crevices between rocks in alpine boulder and rock field and rocky of gravelly soils of subalpine coniferous forest	No; outside of the Project Area elevation range.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Claytonia parviflora subsp. *grandiflora*	streambank spring beauty	–/–/–/4.2	CNPS	Montiaceae	annual herb	February–May	250–1,200	rocky soils in cismontane woodland	Yes; potential habitat in the Project Area.
Corallorhiza trifida	northern coralroot	–/–/FSW/4.3	ENF	Orchidaceae	perennial rhizomatous herb (achlorophyllous)	June – July	1,370–1,745	Mesic soils in lower montane coniferous forest and at edges of meadows and seeps	Yes; potential habitat in the Project Area.
Cordylanthus tenuis subsp. *brunneus*	serpentine bird's-beak	–/–/-/4.3	CNPS	Orobanchaceae	annual herb (hemiparasitic)	July–August	305–915	Usually serpentinite soils in closed-cone coniferous forest, chaparral, and cismontane woodland	Yes; potential habitat in the Project Area.
Cypripedium montanum	mountain lady's-slipper	–/–/FSS/4.2	ENF	Orchidaceae	perennial rhizomatous herb	March – August	185–2,225	In roadleafed upland forest, cismontane woodland, lower montane coniferous forest, and north Coast coniferous forest	Yes; potential habitat in the Project Area.
Delphinium hansenii subsp. *ewanianum*	Ewan's larkspur	–/–/–/4.2	CNPS	Ranunculaceae	perennial herb	March–May	60–600	Rocky soils in cismontane woodland and valley and foothill grassland	Yes; potential habitat in the Project Area.
Draba asterophora var. *asterophora*	Tahoe draba	–/–/FSS/1B.2	ENF	Brassicacea	perennial herb	July–August (September)	2,500–3,505	Alpine boulder and rock field in subalpine coniferous forest	No; outside of the Project Area elevation range.
Draba asterophora var. *macrocarpa*	Cup Lake draba	–/–/FSS/1B.1	CNPS, CNDDB, ENF	Brassicaceae	perennial herb	July–August (September)	2,500–2,815	Rocky soils in subalpine coniferous forest	No; outside of the Project Area elevation range.
Drosera anglica	English sundew	–/–/FSW/1B.1	ENF	Droseraceae	perennial herb	June–September	1,300–2,255	Bogs and fens, meadows and seeps with mesic soil	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
					(carnivorou s)				habitat in the Project Area.
Drosera rotundifolia	Round-leaved sundew	–/–/FSW/–	ENF	Droseraceae	perennial herb	June–September	0–2,700	Swamps, wet meadows, forests, peatlands, often with Sphagnum	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & ENF 2017b).
Dryopteris filix-mas	male fern	–/–/FSW/2B.4	ENF	Dryopteridac eae	perennial rhizomatou s herb	June–September	2,400–3,100	Granitic, rocky soils in upper montane coniferous forests	No; outside of the Project Area elevation range.
Epilobium howellii	subalpine fireweed	–/–/-/4.3	ENF	Onagraceae	perennial stolonifero us herb	July –August	2,000–3,120	Mesic soils in meadows and seeps, and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Epilobium oreganum	Oregon fireweed	–/–/–/1B.2	CNPS	Onagraceae	perennial herb	June–September	500–2,240	Mesic areas of bogs and fens, lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Erigeron eatonii var. *nevadincola*	Nevada daisy	–/–/–/2B.3	CNPS	Asteraceae	perennial herb	May–July	1,400–2,900	Rocky soils in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland	Yes; potential habitat in the Project Area.
Erigeron miser	starved daisy	–/–/–/1B.3	CNPS, CNDD B	Asteraceae	perennial herb	June–October	1,84–2,620	Rocky soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Eriogonum	brown-	–/–/FSW/4.3	ENF	Polygonacea	perennial	June– August	1,800–3,400	Granitic and sandy soils	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
ovalifolium var. *eximium*	margined buckwheat			e	herb			in alpine boulder and rock field, and subalpine coniferous forest	documented in the Project Area (Atkins 2016 & ENF 2017b).
Eriogonum tripodum	tripod buckwheat	–/–/FSS/4.2	CNPS, ENF	Polygonacea e	perennial deciduous shrub	May–July	200–1,600	Often serpentinite soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area.
Eriogonum umbellatum var. *torreyanum*	Donner Pass buckwheat	–/–/–/1B.2	CNPS, CNDD B	Polygonacea e	perennial herb	July–September	1,855–2,620	Volcanic or rocky soils in meadows and seeps and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	–/–/FSW/4.3	ENF	Campanulac eae	annual herb	May–June	320–610	Serpentinite or lone soils in cismontane woodland	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Glyceria grandis	American manna grass	–/–/FSW/2B.3	CNPS, CNDD B, ENF	Poaceae	perennial rhizomatou s herb	June–August	15–1,980	Bogs and fens, meadows and seeps, and marshes and swamps along streambanks and lake margins	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Hackelia amethystina	amethyst stickseed	–/–/–/4.3	CNPS	Boraginacea e	perennial herb	June–July (August)	1,500–2,315	Openings and disturbed areas in lower montane coniferous forest, meadosw and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Horkelia parryi	Parry's	–/–/FSS/1B.2	CNPS,	Rosaceae	perennial	April–	80–1,070	Lone formation and other	Yes;

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	horkelia		CNDDB, ENF		herb	September		soils in chaparral and cismontane woodland	potential habitat in the Project Area.
Jensia yosemitana	Yosemite tarplant	–/–/–/3.2	ENF	Asteraceae	annual herb	(April), May – July	1,200–2,300	Lower montane coniferous forest and meadows and seeps	Yes; potential habitat in the Project Area.
Lewisia kelloggii subsp. *hutchisonii*	Hutchison's lewisia	–/–/FSS/3.2	CNPS, ENF	Montiaceae	perennial herb	(April), May–August	765–2,365	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Lewisia kelloggii subsp. *kelloggii*	Kellogg's lewisia	–/–/FSS/3.2	CNPS, ENF	Montiaceae	perennial herb	(April), May–August	1,465–2,365	Openings and ridgetops in often slate or sometimes rhyolite tuff soils in upper montane coniferous forest	Yes; potential habitat in the Project Area.
Lewisia longipetala	long-petaled lewisia	–/–/FSS/1B.3	CNPS, CNDDB, ENF	Montiaceae	perennial herb	July–August (September)	2,500–2,925	Granitic soils in alpine boulder and rock field and mesic rocky areas of subalpine coniferous forest	No; outside of the Project Area elevation range.
Lewisia serrata	saw-toothed lewisia	–/–/FSS/1B.1	CNPS, CNDDB, ENF	Montiaceae	perennial herb	May–June	770–1,435	Mesic areas, rocky slopes in broadleafed upland forest, lower montane coniferous forest, and riparian forest	Yes; documented in the Project Area (CDFW 2017b).
Lilium humboldtii subsp. *humboldtii*	Humboldt lily	–/–/–/4.2	CNPS	Liliaceae	perennial bulbiferous herb	May–July (August)	90–1,280	Openings in chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Mimulus laciniatus	cut-leaved monkeyflower	–/–/FSW/4.3	ENF	Phrymaceae	annual herb	April – July	490–2,650	Mesic, granitic soils in chaparral, lower montane coniferous forest, and	Yes; potential habitat in the

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
								upper montane coniferous forests	Project Area.
Mimulus pulchellus	yellow-lip pansy monkeyflower	–/–/FSS/1B.2	ENF	Phrymaceae	annual herb	April – July	600–2,000	Vernally mesic, often disturbed areas, clay, lower montane coniferous forest, meadows and seeps	Yes; potential habitat in the Project Area.
Myrica hartwegii	Sierra sweet bay	–/–/FSW/4.3	CNPS, ENF	Myricaceae	perennial deciduous shrub	May–June	150–1,750	Cismontane woodland, lower montane coniferous forest, and riparian forest	Yes; potential habitat in the Project Area.
Navarretia prolifera subsp. *lutea*	yellow bur navarretia	–/–/FSS/4.3	CNPS, ENF	Polemoniaceae	annual herb	May–July	853–1,402	Chaparral and cismontane woodland	Yes; documented in the Project Area (ENF 2017b).
Ophioglossum pusillum	northern adder's-tongue	–/–/FSS/2B.2	CNPS, CNDDB, ENF	Ophioglossaceae	perennial rhizomatous herb	July	1,000–2,000	Meadows and seeps and the margins of marshes and swamps	Yes; potential habitat in the Project Area.
Packera layneae	Layne's ragwort	FT/CR/FSS/1B.2	ENF, CNPS, CNDDB, USFWS	Asteraceae	perennial herb	April–August	200–1,085	Serpentinite or gabbroic rocky soils in chaparral and cismontane woodland	Yes; potential habitat in the Project Area
Perideridia bacigalupii	Bacigalupi's yampah	–/–/FSW/4.2	ENF	Apiaceae	perennial herb	June – August	450–1,035	Serpentinite soils in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Phacelia stebbinsii	Stebbins' phacelia	–/–/FSS/1B.2	CNPS, CNDDB, ENF	Hydrophyllaceae	annual herb	May–July	610–2,010	Cismontane woodland, lower montane coniferous forest, and meadows and seeps	Yes; documented in the Project Area

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
									(DTA 2004, Atkins 2016, CDFW 2017b & ENF 2017b).
Pinus albicaulis	white bark pine	–/–/FSS/–	ENF	Pinaceae	perennial evergreen tree	N/A	2,000–3,700	Upper red-fir forest to timberline, especially subalpine forest	No; outside of the Project Area elevation range.
Pinus monophylla	two-needle pinyon pine	–/–/FSW/3.3	ENF	Pinaceae	perennial evergreen tree	N/A	1,300–2,700	Lower montane coniferous forest and pinyon and juniper	Yes; potential habitat in the Project Area.
Piperia colemanii	Coleman's rein orchid	–/–/FSW/4.3	CNPS, ENF	Orchidaceae	perennial herb	June–August	1,200–2,300	Often sandy soils in chaparral and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Piperia leptopetala	narrow-petaled rein orchid	–/–/FSW/4.3	ENF	Orchidaceae	perennial herb	May–July	380–2,225	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Poa sierrae	Sierra blue grass	–/–/FSS/1B.3	CNPS, CNDDB, ENF	Poaceae	perennial rhizomatous herb	April–July	365–1,500	Openings in lower montane coniferous forest	Yes; potential habitat in the Project Area.
Polystichum lonchitis	northern holly fern	–/–/–/3	CNPS	Dryopteridaceae	perennial rhizomatous herb	June–September	1,800–2,600	Granitic or carbonate soils in subalpine coniferous forest and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Potamogeton epihydrus	Nuttall's ribbon-	–/–/–/2B.2	CNPS, CNDD	Potamogetonaceae	perennial rhizomatou	(June), July–September	369–2,172	Assorted shallow freshwater marshes and	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
	leaved pondweed		B		s herb			swamps	habitat in the Project Area.
Pseudostellaria sierrae	Sierra starwort	–/–/FSW/4.2	CNPS, ENF	Caryophyllaceae	perennial rhizomatous herb	May–August	1,225–2,194	Chaparral, cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (ENF 2017b).
Rhamnus alnifolia	alder buckthorn	–/–/–/2B.2	CNPS, CNDDB	Rhamnaceae	perennial deciduous shrub	May–July	1,370–2,130	Lower montane coniferous forest, meadows and seeps, riparian scrub, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Rhynchospora alba	white beaked-rush	–/–/FSW/2B.2	ENF	Cyperaceae	perennial rhizomatous herb	June – August	60–2,040	Bogs and fens, meadows and seeps and freshwater marshes and swamps	Yes; potential habitat in the Project Area.
Rhynchospora capitellata	brownish beaked-rush	–/–/FSW/2B.2	CNPS, CNDDB	Cyperaceae	perennial herb	July–August	45–2,000	Mesic soils in lower montane coniferous forest, meadows and seeps, marshes and swamps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Rorippa subumbellata	Tahoe yellow cress	–/CE/–/1B.1	CNPS, CNDDB	Brassicaceae	perennial rhizomatous herb	May–September	1,890–1,905	Decomposed granitic beaches in lower montane coniferous forest, and meadows and seeps	Yes; potential habitat in the Project Area.
Sambucus nigra subsp. *caerulea*	blue elderberry	–/–/FSW/–	ENF	Adoxaceae	shrub	March – September	0–3,000	Streambanks and open places in forest	Yes; potential habitat in the Project Area.
Schoenoplectus subterminalis	water bulrush	–/–/–/2B.3	CNPS, CNDD	Cyperaceae	perennial rhizomatou	June–August (September)	750–2,250	Bogs and fens and marshes and swamps	Yes; potential

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
			B		s herb			along montane lake margins	habitat in the Project Area.
Scutellaria galericulata	marsh skullcap	–/–/–/2B.2	CNPS, CNDDB	Lamiaceae	perennial rhizomatous herb	June–September	0–2,100	Lower montane coniferous forest, mesic meadows and seeps, and marshes and swamps	Yes; potential habitat in the Project Area.
Silene occidentalis subsp. *occidentalis*	Western campion	–/–/–/4.3	CNPS	Caryophyllaceae	perennial herb	June–August	1,230–2,090	Dry, open sites, sometimes rocky soils in chaparral, lower montane coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Sparganium natans	small bur-reed	–/–/FSW/4.3	ENF	Typhaceae	perennial rhizomatous herb (emergent)	June – September	1,625–2,500	Bogs and fens, meadows and seeps, marshes and swamps, along lake margins	Yes; potential habitat in the Project Area.
Sphaeralcea munroana	Munro's desert mallow	–/–/–/2B.2	CNPS, CNDDB	Malvaceae	perennial herb	May–June	2,000–2,000	Great Basin scrub	Yes; potential habitat in the Project Area.
Stachys pilosa	hairy marsh hedge-nettle	–/–/–/2B.3	CNPS, CNDDB	Lamiaceae	perennial rhizomatous herb	June–August	1,200–1,770	Mesic Great Basin scrub and meadows and seeps	Yes; potential habitat in the Project Area.
Streptanthus longisiliquus	long-fruit jewelflower	–/–/FSW/4.3	ENF	Brassicaceae	perennial herb	April–September	715–1,500	Openings in cismontane woodland, lower montane coniferous forest	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Stuckenia filiformis subsp. *alpina*	slender-leaved pondweed	–/–/–/2B.2	CNPS, CNDDB	Potamogetonaceae	perennial rhizomatous herb	May–July	300–2,150	Assorted shallow freshwater marshes and swamps	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Taxus brevifolia	Pacific yew	–/–/FSW/–	ENF	Taxaceae	tree	Not applicable	10–2,150	Dense, mixed-evergreen forests, lower slopes, and canyon bottoms	Yes; documented in the Project Area (DTA 2004 & ENF 2017b).
Torreya californica	California nutmeg	–/–/FSW/–	ENF	Taxaceae	tree	Not applicable	10–2,100	Shady moist canyons in forest or woodland, occasionally chaparral	Yes; documented in the Project Area (Atkins 2016 & ENF 2017b).
Viburnum ellipticum	oval-leaved viburnum	–/–/FSW/2B.3	CNPS, CNDDB	Adoxaceae	perennial deciduous shrub	May–June	215–1,400	Chaparral, cismontane woodland, and lower montane coniferous forest	Yes; potential habitat in the Project Area.
Viola tomentosa	felt-leaved violet	–/–/–/4.2	CNPS, CNDDB	Violaceae	perennial herb	(April), May–October	1,435–2,000	Gravelly soils in lower montane coniferous forest, subalpine coniferous forest, and upper montane coniferous forest	Yes; documented in the Project Area (DTA 2004, Atkins 2016 & CDFW 2017b)
Wyethia reticulata	El Dorado County mule ears	–/–/FSW/1B.2	ENF	Asteraceae	perennial herb	April – August	185–230	Clay or gabbroic soils in chaparral, cismontane woodland and lower montane coniferous forest	No; outside of the Project Area elevation range.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Fungi									
Dendrocollybia racemosa	branched collybia	–/–/FSS/–	ENF	Cudoniaceae	fungi	fruits primarily in spring	160–1,827	Common under conifers in mature moist coniferous forests in northern CA and the Pacific Northwest. Typically associated with very rotten wood[4]	Yes; potential habitat in the Project Area.
Phaeocollybia olivacea	olive phaeocollybia	–/–/FSS/–	ENF	Cortinariaceae	fungi	fruits September–December	6–962	Grows on ground in mixed woods and under conifers in southern Oregon and northern California[4]	Yes; potential habitat in the Project Area.
Lichens									
Peltigera gowardii	western waterfan lichen,	–/–/FSS/4.2	CNPS, CNDDB, ENF	Peltigeraceae	foliose lichen (aquatic)	Not applicable	1,065–2,620	On rocks in cold water creeks with little or no sediment or disturbance in riparian forests	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
Bryophytes									
Bruchia bolanderi	Bolander's bruchia	–/–/FSS/4.2	CNPS, ENF	Bruchiancea e	moss	Not applicable	1,700–2,800	Damp soils in lower montane coniferous forest, meadosw and seeps, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Helodium blandowii	Blandow's bog moss	–/–/FSS/2B.3	ENF	Helodiaceae	moss	Not applicable	1,862–2,700	Damp soil in meadows and seeps and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Meesia uliginosa	broad-nerved hump moss	–/–/FSS/2B.2	CNPS, CNDD B	Meesiaceae	moss	Not applicable	1,210–2,804	Damp soil in bogs and fens, meadows and seeps, subalpine coniferous forest, and upper montane coniferous forest	Yes; potential habitat in the Project Area.
Mielichhoferia elongata	elongate copper moss	–/–/FSS/4.3	ENF	Mielichhofer iaceae	moss	Not applicable	0–1,960	Metamorphic rock, usually acidic, usually vernally mesic, often roadsides, sometimes carbonate, broadleafed upland forest, chaparral, cismontane woodland, coastal scrub, and lower montane coniferous forest , meadows and seeps, and subalpine coniferous forest	Yes; potential habitat in the Project Area.
Orthotrichum holzingeri	Holzinger's orthotrichum moss	–/–/FSW/1B.3	ENF	Orthotrichac eae	moss	Not applicable	715–1,800	Usually on rock in and along streams, rarely on tree limbs, in cismontane woodland, lower	Yes; potential habitat in the Project Area.

Scientific name	Common name	Status[2] Federal/State/ USFS/CRPR	Query sources	Family	Life form	Blooming period[3]	Elevation range (m)[3]	Habitat associations[3]	Potential habitat within the Project Area
								montane coniferous forest, pinyon and juniper woodland, and upper montane coniferous forest	

[1] Project Vicinity: the USGS 7.5' quadrangles in which the Project is located (Wentworth Springs, Homewood, Robbs Peak, Loon Lake, Rockbound Valley, Slate Mountain, Pollock Pines, Riverton and Kyburz), and the surrounding quadrangles (Royal Gorge, Granite Chief, Tahoe City, Kings Beach, Greek Store, Bunker Hill, Meeks Bay, Georgetown, Tunnel Hill, Devil Peak, Emerald Bay, Garden Valley, Pyramid Peak, Echo Lake, Placerville, Camino, Sly Park, Old Iron Mountain, Leek Spring Hill, and Tragedy Spring).

[2] Status:

Federal
FT Federally listed as threatened
– No federal status

State
CR California State listed as rare
– No state status

USFS
FSS USFS Sensitive
FSW USFS Watch List

California Rare Plant Rank (formerly known as CNPS Lists)
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California, but more common elsewhere
3 More information needed about this plant, a review list
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:
0.1 Seriously threatened in California (high degree/immediacy of threat)
0.2 Fairly threatened in California (moderate degree/immediacy of threat)
0.3 Not very threatened in California (low degree/immediacy of threats or no current threats known)

[3] All data from ENF (2016, 2017a), CNPS (2017), or Baldwin et al. (2012) unless otherwise noted.

[4] Information sources include Arora, D. 1986. Mushrooms demystified a comprehensive guide to the fleshy fungi. Second edition. Ten Speed Press, Berkeley, California; and USDA Forest Service and BLM (Bureau of Land Management). 2017. Interagency Special Status/Sensitive Species Program (ISSSSP). Website. https://www.fs.fed.us/r6/sfpnw/issssp/species-index/flora-fungi.shtml [Accessed September 20, 2017].

Appendix C

Sensitive Plant List for the Eldorado National Forest

Table C-1. Threatened, endangered, and sensitive plants known to occur or with suitable habitat on the ENF (May 3, 2016).

Species	Status[1]	On ENF[2]	Rationale for determination of no suitable habitat/no effect
Three-bracted onion (*Allium tribracteatum*)	S	P	Grows on open ridges with gravelly lahar soils (lava cap communities) in chaparral and lower & upper montane coniferous forests from ~ 3,300 to 10,000 feet in elevation.
El Dorado manzanita (*Arctostaphylos nissenana*)	S	K	Grows on highly acidic slate and shale soils and is often associated with closed-cone conifer forest from about 1,400 to 3,600 feet.
Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	S	P	Grows in chaparral, vernally moist meadows & grasslands, grasslands within oak woodland, and ponderosa pine forest below 4,600 feet.
Upswept moonwort (*Botrychium ascendens*)	S	P	Grows in lower montane coniferous forest, meadows, and seeps from 4,900 to over 7,500 feet in elevation.
Scalloped moonwort (*Botrychium crenulatum*)	S	K	Grows in fens, lower montane coniferous forest, meadows, seeps, and freshwater marshes from 4,900 feet to 10,500 feet in elevation.
Common moonwort (*Botrychium lunaria*)	S	P	Grows in meadows, seeps, subalpine and upper montane coniferous forest from 7,450 feet to over 11,000 feet in elevation.
Mingan moonwort (*Botrychium minganense*)	S	K	Grows in fens, lower and upper montane coniferous forest, meadows, and seeps from 4,900 to 6,750 feet.
Mountain moonwort (*Botrychium montanum*)	S	K	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Paradox moonwort (*Botrychium paradoxum*)	S	K	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Stalked moonwort (*Botrychium pendunculosum*)	S	P	Grows in lower and upper montane coniferous forest, meadows, and seeps from 4,900 feet to 7,000 feet in elevation.
Bolander's bruchia (*Bruchia bolanderi*)	S	K	Grows in meadows and fens in montane and subalpine communities from about 5,500 to 9,000 feet. Grows in ephemeral habitats such as erosional ditches or small streamlets through wet meadows.
Pleasant Valley mariposa lily (*Calochortus clavatus* var. *avius*)	S	K	Grows in openings in mixed conifer & ponderosa pine forest, usually on ridgetops and south-facing slopes from 2,500 to 5,600 feet. There are numerous Occurrences along Weber Mill Road and 11N38G.

Species	Status[1]	On ENF[2]	Rationale for determination of no suitable habitat/no effect
Mountain lady's slipper (*Cypripedium montanum*)	S	P (K on inholding)	Grows in moist areas and upland sites with northerly aspects, loamy soils and shade, from 3,500 to 5,700 feet (generally <5,000 ft).
Branched collybia (*Dendrocollybia racemosa*)	S	K	Grows on remains of decayed mushrooms or occasionally in duff/leaf litter, in mid-mature to old-growth stands of mixed hardwood-conifer forests. Evidence of timber harvest at some extant occurrences.
Tahoe draba (*Draba asterophora* var. *asterophora*)	S	H	Restricted to rocky ledges and talus slopes in subalpine and alpine habitats above 8,200 feet.
Cup Lake draba (*Draba asterophora* var. *macrocarpa*)	S	K	Restricted to sandy slopes, rocky ledges, and talus slopes in subalpine and alpine habitats above 8,200 ft.
Tripod buckwheat (*Eriogonum tripodum*)	S	K	Grows on serpentine soils in foothill and cismontane woodlands below 5,300 feet.
Blandow's bog-moss (*Helodium blandowii*)	S	P	Grows in wet meadows, fens, & seeps in subalpine coniferous forest and alpine lakes from 6,100 to 9,000 feet.
Parry's horkelia (*Horkelia parryi*)	S	K	Grows on stony, disturbed, slightly acidic soils in open chaparral and cismontane woodland below 3,400 feet.
Hutchison's lewisia (*Lewisia kelloggii* subsp. *hutchisonii*)	S	K	Grows in openings in upper montane coniferous forest, often on slate soils and on soils that are sandy granitic to erosive volcanic from 4,800 to 7,000 feet.
Kellogg's lewisia (*Lewisia kelloggii* subsp. *kelloggii*)	S	K	Grows on granitic and volcanic balds from about 5,000 to 8,000 feet.
Long-petaled lewisia (*Lewisia longipetala*)	S	K	Restricted to subalpine & alpine slopes or basins with deep snow accumulations, above 8,200 feet.
Saw-toothed lewisia (*Lewisia serrata*)	S	K	Restricted to steep, nearly vertical cliffs in inner gorges of perennial streams and rarely near seeps and intermittent streams. Grows between 2,800 and 4,800 feet in the American River watershed.
Broad-nerved hump-moss (*Meesia uliginosa*)	S	P	Grows in permanently wet, primarily spring-fed meadows and fens in montane to subalpine coniferous forest from 4,200 to 9,200 feet.
Elongate Copper Moss (*Mielichhoferia elongata*)	S	P	Grows on metamorphic, sedimentary, limestone, and serpentine rock outcrops that often contain copper or other heavy metals and that are seasonally moist or less commonly on moist soil. Usually in foothill woodland habitats dominated by oaks or chaparral and sometimes with scattered incense cedar, Douglas-fir, and ponderosa pine. Grows from sea level to 3550 feet.

Species	Status[1]	On ENF[2]	Rationale for determination of no suitable habitat/no effect
Yellow-lip pansy monkeyflower (*Mimulus pulchellus*)	S	K	Habitat is vernally wet to moist sites which are open and flat or slightly sloping. Typically found on lava caps but soils can be clay, volcanic, or granitic. Grows from 2,200 to 6,400 feet.
Yellow bur navarretia (*Navarretia prolifera* subsp. *lutea*)	S	K	Grows in openings in or adjacent to mixed conifer forest or cismontane woodland on rocky ridgelines, saddles, or eroding ephemeral drainages from 2,300 to 5,000 feet.
Adder's tongue (*Ophioglossum pusillum*)	S	P	Grows in moist habitat including wet meadows and roadside ditches.
Layne's ragwort (*Packera layneae*)	T, S	K	Grows on rocky, gabbroic or serpentinitic soils in chaparral and cismontane woodland below 3,000 feet.
Veined water lichen (*Peltigera gowardii*)	S	K	Grows on rocks in cold, unpolluted spring-fed streams without marked seasonal fluctuation. Submerged most of year. Peak flows must not scour the rocks & gravels where this species attaches. Located on the ENF in 2008.
Stebbins' phacelia (*Phacelia stebbinsii*)	S	K	Grows on dry, open, rocky sites (bedrock outcrops, rubble or talus) on ledges or moderate to steep slopes and on damp, mossy inner gorges from 2,000 to 6,800 feet.
Olive phaeocollybia (*Phaeocollybia olivacea*)	S	P (K on inholding)	Conifer and hardwood forests where it grows in the humus layer. Logging disturbance, when present, is not intense (e.g., clear-cut or patch-cut).
Whitebark pine (*Pinus albicaulis*)	C, S	K	Whitebark pine typically occurs on cold and windy high elevation sites in western north America (7,000-12,000 feet).
Sierra blue grass (*Poa sierrae*)	S	K	Grows in lower montane coniferous forest on steep, shady, moist slopes from 1,200 feet to 3,800 feet.

1 T =Federally Listed as Threatened; C = Federally Listed as Candidate; S = USFS Sensitive
2 K = known to occur on ENF; P = suspected to occur on ENF; H = historic record on ENF

Appendix D

Watch List for Eldorado National Forest

Table D-1. Eldorado National Forest Watch List Species (January 26, 2017).

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Allium sanbornii var. *congdonii*	Congdon's onion	4.3	Serpentine outcrops	Traverse Creek	Up to 4,000	
Allium sanbornii var. *sanbornii*	Sanborn's onion	4.2	Serpentine outcrops	**Potential—**occurs on Tahoe NF	Up to 5,020	
Astragalus austiniae	Austin's milkvetch	1B.3	Alpine boulder & rock field in subalpine coniferous forest.	Along Shealor Lake trail	7,600	8,825
Astragalus whitneyi var. *lenophyllus*	Whitney's milk-vetch	4.3	Alpine boulder & rock field in subalpine coniferous forest.	Originally identified at Kirkwood Mountain Resort. Misidentified - no known occurrences on Forest.	Above 4,900	
Bolandra californica	Sierra bolandra	4.3	Rock crevices and wet cliffs along streams.	Alder Creek, Jaybird Canyon	3,100	4,200
Botrychium simplex	Yosemite moonwort	--	Moist and wet meadow, seeps, fens and streamside habitats about 6,000 feet in elevation.	Widespread	Above 5,000	
Calystegia vanzuukiae	Van Zuuk's morning glory	1B.3	Serpentine outcrops	Traverse Creek, Little Bald Mountain	1,640	3,900
Carex cyrtostachya	arching sedge	1B.2	Narrow endemic from the western slope of the northern Sierra Nevada of California	Traverse Creek, Blodgett, Kings Meadow near headwaters of Slab Creek	2,000	4,460

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Carex davyi	Davy's sedge	1B.3	Upper montane coniferous forest to Subalpine coniferous forest; Dry often sparse meadows or rocky areas.	Indian Valley?, Lake Winnemucca, Hermit Valley, Slippery Ford (1897 herbarium record)	Above 4,500	
Climacium dendroides	tree climacium moss	2B.1	Occurs in occasionally flooded mineral soil, especially on lake and river margins	Soldier Creek	Above ~3,500 (limited information available)	
Ceanothus fresnensis	Fresno ceanothus	4.3	Cismontane woodland (openings), lower montane coniferous forest	Chaix Mountain, Telephone Ridge, Bunker Hill	3,650	6,900
Chaenactis douglasii var. *alpina*	alpine dusty maindens	2B.3	Alpine boulder and rock field (granitic), Rocky or gravelly ridges, talus, fell-fields, crevices	Kirkwood Mountain Resort, Round Top, Carson Pass area	Above 9,800	
Chlorogalum grandiflorum	red hills soapwort	1B.2	Serpentine outcrops, open shrubby or wooded hills; Chaparral, Foothill Woodland, Yellow Pine Forest	Widespread – western Georgetown District	Up to 3,150	

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Clarkia biloba subsp. *brandegeeae*	Brandegee's clarkia	4.2	Foothill woodland, chaparral, cismontane woodland, lower montane coniferous forest. Often found growing in road cuts	Slab Creek Reservoir and Ralston Ridge	Up to 3,000	
Clarkia virgata	Sierra clarkia	4.3	Foothill woodland, cismontane woodland, lower montane coniferous forest, yellow pine forest	Nevada Point Ridge; Herbarium records from Forebay Rd, Sugarloaf, Riverton, Plum Creek Ridge,	2,460 to 5,675	
Claytonia megarhiza	fell-fields claytonia	2B.3	Subalpine, alpine gravel, talus, crevices, growing In crevices between rocks in rocky or gravelly soils.	**Potential**- Dick's Peak in Desolation Wilderness	Above 8,500	
Corallorhiza trifida	northern coralroot; early coralroot	2B.1	Wet, open to shaded, generally coniferous forest. In California, under firs, in partial shade	**Potential**- CNDDB records from Plumas County. One report from Lake Tahoe region.	4,500	5,600
Drosera anglica	English sundew	2B.3	Fens, meadows and seeps often with Sphagnum	**Potential**- Sagehen Creek Field Station, Tahoe National Forest	4,250	6,500
Drosera rotundifolia	round leaf sundew	--	Fens, meadows and seeps often with Sphagnum	Widespread	Up to 8,900	

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Dryopteris filix-mas	male fern	2B.3	Upper montane coniferous forest (granitic, rocky); Granitic cliffs	Historic herbarium record from Cole Creek Road	Above 7,800	
Githopsis pulchella subsp. *serpentinicola*	serpentine bluecup	4.3	Cismontane woodland, serpentine or Ione Formation soils	SMUD transmission line/Iowa Hill area on Placerville RD	1,000	2,000
Jensia yosemitana	Yosemite tarweed	3.2	Spring-wet, sunny, sandy places, meadows	Bassi Falls	4000	7500
Mimulus laciniatus	cutleaf monkey flower	4.3	Growing on decomposed granite in moist sandy places.	Salt Springs Reservoir, Cole Creek Diversion	Above 3,100	
Myrica hartwegii	Sierra sweet bay	4.3	streambanks and other moist places in foothill and low montane forest	Big Grizzly Canyon, Stumpy Meadows, Alder Creek, Camp Creek	Up to 6,000	
Orthotrichum holzingeri	Holzinger's orthotrichum moss	1B.3	Usually on rock in and along streams, rarely on tree limbs	North shore of Salt Springs Reservoir	2,345	6,000
Perideridia bacigalupii	Mother Lode Yampah	4.2	Sites in which it occurs include open rocky areas, chaparral openings, slopes, and road cuts. Usually on serpentine	**Potential**- Historic Stebbins's collection from Rescue	Up to 3,500	
Piperia colemanii	Coleman's Rein Orchid	4.3	Open conifer forest, scrub; often in sandy soils.	Nevada Point Ridge, Gerle Creek, Loon Lake Rd, Bassi Creek	3,900	7,545

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Piperia leptopetala	petaled rein orchid	4.3	Generally dry sites, scrub, woodland; Chaparral, Foothill Woodland, Yellow Pine Forest, Red Fir Forest.	Big Meadow Campground and Hell Hole Reservoir	1,100	7,300
Pseudostellaria sierrae	Sierra Starwort	4.2	Meadows, dry understory of mixed oak or conifer forest	Junction Reservoir	4,000	7,200
Rhynchospora alba	white beaked-rush	2B.2	Wet meadows, fens, seeps, and marshes	**Potential**- on Plumas and Lassen NF and historic occurrence from Yosemite Valley	Up to 6,700	
Rhynchospora capitellata	brownish beakrush	2B.2	Wet meadows, fens, seeps, and marshes	Kings Meadow according to Laurence Janeway (2007)	Up to 6,560	
Sambucus nigra subsp. *caerulea*	blue elderberry	--	Riparian areas; of concern below 3,000' as host plant for Threatened Valley Elderberry Longhorn Beetle	Widespread	Up to 3,200	
Sparganium natans	small bur reed	4.3	Wetland-riparian, lake margins.	Lower Blue Lakes	2,800	8,560
Streptanthus longisiliquus	long-fruit jewelflower	4.3	Mixed-conifer forest	Peavine/Telegraph/Jay bird Ridges on Pacific RD	2,500	5,000

Species	Common name	CRPR ranking	Habitat	Distribution on Eldorado	Lower elevation (ft)	Upper elevation (ft)
Taxus brevifolia	Pacific yew	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest, Red Fir Forest	Widespread- Eldorado NF is near the southern edge of the species range	Up to 4,600	
Torreya californica	California nutmeg	--	Mixed Evergreen Forest, Douglas-Fir Forest, Yellow Pine Forest	Widespread	Up to 3,000	
Viburnum ellipticum	oval-leaved viburnum	2B.3	Chaparral, Cismontane woodland, Lower montane coniferous forest. Chaparral, yellow-pine forest, generally n-facing slopes	**Potential**-City of Placerville, Lake Clementine, Forest Hill Road	Up to 4,500	
Wyethia reticulata	El Dorado County mule ears	1B.2	Stony red clay and gabbroic soils; often in openings in gabbro chaparral	**Potential**- Cameron Park/Pine Hill	Up to 2,060	

Appendix E

Invasive Plant List for the Eldorado National Forest

Table E-1. Invasive Plant List for the Eldorado National Forest (November 8, 2016).

Group 1 (Eradicate): Highly invasive species known to occur on the Eldorado National Forest. Species are uncommon and are a priority for inventory, control, and eradication.

Acroptilon repens Russian knapweed
Aegilops triuncialis barbed goatgrass
Ailanthus altissima Chinese tree of heaven
Arundo donax Arundo
Centaurea calcitrapa purple starthistle
Centaurea diffusa diffuse (white) knapweed
Centaurea stoebe spotted knapweed
Cirsium arvense Canada thistle
Euphorbia oblongata oblong spurge
Isatis tinctoria dyer's woad
Lepidium latifolium tall whitetop
Lythrum salicaria purple loosestrife
Sorghum halepense Johnson grass

Group 2 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory all infestations. Annually treat a portion of known infestations, focusing first on eradicating/containing isolated outlying infestations and, over time, reducing the footprint of larger, less isolated infestations.

Carduus pycnocephalus Italian thistle
Centaurea melitensis tocalote
Centaurea solstitialis yellow starthistle
Chondrilla juncea rush skeleton weed
Cytisus scoparius Scotch broom
Elymus caput-medusae medusahead
Foeniculum vulgare Fennel
Genista monspessulana French broom
Spartium junceum Spanish broom

Group 3 (Control): Established or widespread species known to occur on the Eldorado National Forest. Inventory and treat isolated leading edge infestations or where concurrent with higher priority infestations.

Brassica nigra black mustard
Bromus tectorum cheat grass
Chenopodium botrys Jerusalem-oak goosefoot
Cirsium vulgare bull thistle
Hedera helix English Ivy
Hypericum perforatum Klamath weed
Lathyrus latifolius perennial sweet pea
Leucanthemum vulgare Oxeye daisy
Melilotus alba white sweet clover
Melilotus officinalis yellow sweet clover
Rubus armeniacus Himalayan blackberry
Rubus lacineatus cut leaf blackberry
Salsola tragus Russian thistle/tumbleweed
Silybum marianum milk thistle
Torilis arvensis hedge parsley
Tribulus terrestris puncture vine
Vinca major periwinkle

Group 4 (Manage through education and prevention): Species are well established across forest or have minor economic or ecological impacts. Forest will use appropriate prevention and education measures to limit further spread.

Bromus diandrus ripgut brome
Bromus madritensis var. *rubens* red brome
Conium maculatum poison hemlock
Cynodon dactylon Bermuda grass
Cynosurus echinatus spiny dogtail
Dactylis glomerata Orchard grass
Festuca arundinacea tall fescue
Hirschfeldia incana mustard
Lychnis coronaria rose campion/ mullein pink
Sisymbrium altissimum Jim Hill mustard
Verbascum thapsus mullein

<u>Potential invasives:</u> Species not yet found on the Eldorado National Forest. If found, infestations should be inventoried and targeted for eradication or control.

Aegilops cylindrica Jointed goatgrass
Cardaria chalepensis small whitetop
Cardaria draba hoarycress
Cardaria pubescens whitetop
Carduus nutans musk thistle
Carthamus lanatus Woolly distaff thistle
Centaurea pratensis meadow knapweed
Centaurea sulphurea Sicilian starthistle
Cortaderia selloana pampas grass
Dittrichia graveolens stinkwort
Euphorbia esula leafy spurge
Linaria genistifolia subsp. *dalmatica* dalmatian toadflax
Linaria vulgaris yellow toadflax
Nicotiana glauca Tree tobacco
Onopordum acanthium Scotch thistle
Phragmites australis common reed
Phytolacca amaericana Pokeweed
Polygonum cuspidatum Japanese knotweed
Polygonum sachalinense Sakhalin knotweed
Potentilla recta Sulfur cinquefoil
Sesbania punicea Scarlet wisteria
Tamarix chinensis Salt Cedar
Tanacetum vulgare tansy
Ulex europaeus Gorse

APPENDIX H

PESTICIDE SPILL PREVENTION, CONTROL, AND COUNTER- MEASURE PLAN

I. Introduction

This Plan is prepared as a best management practice for the integrated vegetation management plan proposed by the Sacramento Municipal Utility District (SMUD) to apply herbicide within the right-of-way (ROW) of the transmission lines, along roads, and surrounding hydroelectric facilities on the Eldorado National Forest.

This Plan outlines the procedures to be used for spill prevention and in response to an accidental spill of pesticides, should one occur, during the transportation, handling, mixing, and application.

II. Spill Response - General

The senior ranking employee at the site will take charge and arrange the following:

- Take necessary action to protect employees, the public and the environment.
- Communicate the situation and seek help, if needed.

III. Actions to Take

- Assess the extent of the spill for reporting.
- Notify Eldorado National Forest Dispatch at (530) 644-2349.
- Immediately take measures to contain and isolate the spill to prevent it from spreading.
- Initiate clean-up activities in accordance with established procedures.
- Bring in additional personnel, if required.

IV. Manufacturer's Spill Clean-up Specifications

Herbicides (active ingredient and preferred formulation) proposed for use in the plan are listed in Table 5-1. Formulation is the commercial or registrant's brand name and label.

The registrants' specifications for a spill of any one of the products listed in Table 5-1 include the following:

- Soak-up the spill using absorbent material such as sand.
- Remove contaminated material and soil to an approved land-fill.

Product Specific emergency response and containment information is included on each formulated product Material Safety data sheet (MSDS).

V. Specific Prevention and Spill Action Measures

- Identify the highest spill potential risk areas (i.e., transportation, mixing, and handling of herbicides).
- MSDSs for each product shall be carried in the vehicle(s) transporting herbicides and also at the job site.
- A licensed Qualified Applicator(s) shall be responsible for all phases of herbicide operations from storage, transportation, mixing, handling, and application.
- All personnel associated with herbicide operations shall be trained annually in the application, spill prevention, and clean-up procedures.
- Required personal protective equipment (PPE) shall be used during all phases of herbicide operations.
- Spill containment materials shall be available during all phases of herbicide operations, including: hand tools, absorbent materials, and plastic bags for cleanup and disposal of contaminated soil. This would include a 5 gallon re-sealable over pack with sufficient containment equipment.
- Herbicide concentrate shall be stored in a locked facility during non-use periods. Tank-mixed herbicides will have an identification tag and the container will have a locked cap.
- Herbicides will be transported in small containers (i.e., 2.5 gallons) within protective boxes and in small volumes (a maximum of 20-30 gallons).
- Direct radio/telephone communications links to Steve Hallmark, SMUD Vegetation Manager, will be established to initiate the Notification Process. The following are the communication links:
    - Steve Hallmark: cell (916) 600-7576, office (916) 732-6251, or Phil Bien: cell (916) 801-2312, office (530)644-2013.
    - Contact information will be updated prior to implementation each year during the agency review period.

Appendix B

Special-Status Plant Species Documented in the Project Vicinity

Table B-1. Special-Status Plants Documented in the Project Vicinity[1].

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Federally Listed Species									
Arctostaphylos myrtifolia	Ione manzanita	FT/–/BLMS/1B.2	BLM	Ericaceae	perennial evergreen shrub	Nov–Mar	195–1,905	Acidic, Ione, clay, or sandy soils in chaparral or cismontane woodland	No, not located in or adjacent to Project Area
Calystegia stebbinsii	Stebbins' morning-glory	FE/CE/ BLMS/1B.1	USFWS, CNDDB, CNPS, BLM	Convolvulaceae	perennial rhizomatous herb	Apr–Jul	605–3,575	Gabbroic or serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Ceanothus roderickii	Pine Hill ceanothus	FE/CR/ BLMS/1B.1	USFWS, CNDDB, CNPS, BLM	Rhamnaceae	perennial evergreen shrub	Apr–Jun	805–3,575	Serpentinite or gabbroic soils in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Eriogonum apricum var. *apricum*	Ione buckwheat	FE/CE/ BLMS/1B.1	BLM	Polygonaceae	perennial herb	Jul–Oct	195–475	Openings and Ione soil in chaparral	No, not located in or adjacent to Project Area
Fremontodendron decumbens	Pine Hill flannelbush	FE/CR/ BLMS/1B.2	USFWS, CNDDB, CNPS, BLM	Malvaceae	perennial evergreen shrub	Apr–Jul	1,395–2,495	Gabbroic, serpentinite, and rocky areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Galium californicum ssp. *sierrae*	El Dorado bedstraw	FE/CR/ BLMS/1B.2	USFWS, CNDDB, CNPS, BLM	Rubiaceae	perennial herb	May–Jun	330–1,920	Gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest	Yes, located adjacent to northern border of Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Packera layneae	Layne's ragwort	FT/CR/ BLMS/1B.2	USFWS, CNDDB, CNPS, BLM	Asteraceae	perennial herb	Apr–Aug	655–3,560	Serpentinite or gabbroic, rocky areas in chaparral and cismontane woodland	Yes, located in Project Area
Verbena californica	Red Hills vervain	FT/CT/ BLMS/1B.1	BLM	Verbenaceae	perennial herb	May–Sep	855–1,310	Mesic, usually serpentinite, seeps or creeks in cismontane woodland, and valley and foothill grassland	No, not located in or adjacent to Project Area
BLM Sensitive Species									
Allium jepsonii	Jepson's onion	–/– /BLMS/1B.2	CNDDB, CNPS, BLM	Alliaceae	perennial bulbiferous herb	Apr–Aug	985–4,330	Serpentinite or volcanic areas in chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Allium tuolumnense	Rawhide Hill onion	–/– /BLMS/1B.2	BLM	Alliaceae	perennial bulbiferous herb	Mar–May	985–1,970	Serpentinite areas in cismontane woodland	No, not located in or adjacent to Project Area
Arctostaphylos nissenana	Nissenan manzanita	–/– /BLMS/1B.2	CNDDB, CNPS, BLM	Ericaceae	perennial evergreen shrub	Feb–Mar	1,475–3,610	Rocky areas in chaparral and closed-cone coniferous forest	No, not located in or adjacent to Project Area
Balsamorhiza macrolepis	big-scale balsamroot	–/– /BLMS/1B.2	CNDDB, CNPS, BLM	Asteraceae	perennial herb	Mar–Jun	150–5,100	Sometimes serpentinite areas in chaparral, cismontane woodland, and valley and foothill grassland	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Calochortus clavatus var. *avius*	Pleasant Valley mariposa lily	–/– /BLMS/1B.2	BLM	Liliaceae	perennial bulbiferous herb	May–Jul	1,000–5,905	Josephine silt loam and volcanic soils in lower montane coniferous forest	No, not located in or adjacent to Project Area
Calystegia vanzuukiae	Van Zuuk's morning-glory	–/– /BLMS/1B.3	CNDDB, CNPS, BLM	Convolvulaceae	perennial rhizomatous herb	May–Aug	1,640–3,870	Gabbro or serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Chlorogalum grandiflorum	Red Hills soaproot	–/– /BLMS/1B.2	CNDDB, CNPS, BLM	Agavaceae	perennial bulbiferous herb	May–Jun	805–5,545	Serpentinite, gabbroic, and other soils in chaparral, cismontane woodland, and lower montane coniferous forest	Yes, historical occurrence in Project Area (CDFW 2021)
Clarkia biloba ssp. *australis*	Mariposa clarkia	–/– /BLMS/1B.2	BLM	Onagraceae	annual herb	Apr–Jul	985–4,790	Serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Clarkia biloba ssp. *brandegeeae*	Brandegee's clarkia	–/– /BLMS/4.2	CNDDB, CNPS, BLM	Onagraceae	annual herb	May–Jul	245–3,000	Often roadcuts in chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Clarkia rostrata	beaked clarkia	–/– /BLMS/1B.3	BLM	Onagraceae	annual herb	Apr–May	195–1,640	Cismontane woodland, and valley and foothill grassland	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Cryptantha mariposae	Mariposa cryptantha	–/– /BLMS/1B.3	BLM	Boraginaceae	annual herb	Apr–Jun	655–2,135	Rocky and serpentinite areas in chaparral	No, not located in or adjacent to Project Area
Diplacus pulchellus	Yellow-lip pansy monkeyflower	–/– /BLMS/1B.2	BLM	Phrymaceae	annual herb	Apr–Jul	1,970–6,560	Vernally mesic, often disturbed, and clay areas in lower montane coniferous forest, and meadows and seeps	No, not located in or adjacent to Project Area
Erythranthe filicaulis	Slender-stemmed monkeyflower	–/– /BLMS/1B.2	BLM	Phrymaceae	annual herb	Apr–Aug	2,955–5,740	Vernally mesic areas in cismontane woodland, lower montane coniferous forest, meadows and seeps, and upper montane coniferous forest	No, not located in or adjacent to Project Area
Erythronium tuolumnense	Tuolumne fawn lily	–/– /BLMS/1B.2	BLM	Liliaceae	perennial bulbiferous herb	Mar–Jun	1,675–4,480	Broadleafed upland forest, chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Horkelia parryi	Parry's horkelia	–/– /BLMS/1B.2	CNDDB, CNPS, BLM	Rosaceae	perennial herb	Apr–Sep	260–3,510	Chaparral and cismontane woodland	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Iris hartwegii ssp. *columbiana*	Tuolumne iris	–/– /BLMS/1B.2	BLM	Iridaceae	perennial rhizomatous herb	May–Jun	1,395–4,595	Ione formation and other soils in cismontane woodland and lower montane coniferous forest	No, not located in or adjacent to Project Area
Lewisia cantelovii	Cantelow's lewisia	–/– /BLMS/1B.2	BLM	Montiaceae	perennial herb	May–Oct	1,085–4,495	Mesic, granitic, and sometimes serpentinite seeps in broadleafed upland forest, chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Lomatium congdonii	Congdon's lomatium	–/– /BLMS/1B.2	BLM	Apiaceae	perennial herb	Mar–Jun	985–6,890	Serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Lupinus citrinus var. *deflexus*	Mariposa lupine	– /CT/BLMS/ 1B.2	BLM	Fabaceae	annual herb	Apr–May	1,310–2,000	Granitic and sandy areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Lupinus spectabilis	Shaggyhair lupine	–/– /BLMS/1B.2	BLM	Fabaceae	annual herb	Apr–May	855–2,705	Serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Senecio clevelandii var. *heterophyllus*	Red Hills ragwort	–/– /BLMS/1B.2	BLM	Asteraceae	perennial herb	May–Jul	855–1,265	Seeps and serpentinite areas in cismontane woodland	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Wyethia reticulata	El Dorado County mule ears	–/–/BLMS/1B.2	CDFW, CNPS	Asteraceae	perennial herb	Apr–Aug	605–2,065	Clay or gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest	Yes, located in Project Area
State Listed Species									
Allium sanbornii var. *congdonii*	Congdon's onion	–/–/–/4.3	CNPS	Alliaceae	perennial bulbiferous herb	Apr–Jul	985–4,575	Chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Allium sanbornii var. *sanbornii*	Sanborn's onion	–/–/–/4.2	CNPS	Alliaceae	perennial bulbiferous herb	May–Sep	855–4,955	Usually serpentinite and gravelly areas in chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Arctostaphylos mewukka ssp. *truei*	True's manzanita	–/–/–/4.2	CNPS	Ericaceae	perennial evergreen shrub	Feb–Jul	1,395–4,560	Sometimes roadsides in chaparral and lower montane coniferous forest	No, not located in or adjacent to Project Area
Calandrinia breweri	Brewer's calandrinia	–/–/–/4.2	CNPS	Montiaceae	annual herb	(Jan)Mar–Jun	35–4,005	Sandy or loamy soils, disturbed sites and burns in chaparral and coastal scrub	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Carex cyrtostachya	Sierra arching sedge	–/–/–/1B.2	CNDDB, CNPS	Cyperaceae	perennial herb	May–Aug	2,000–4,460	Lower montane coniferous forest, marshes and swamps, meadows and seeps, and riparian forest	No, not located in or adjacent to Project Area
Carex xerophila	chaparral sedge	–/–/–/1B.2	CNDDB, CNPS	Cyperaceae	perennial herb	Mar–Jun	1,445–2,525	Serpentinite and gabbroic areas in chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Ceanothus fresnensis	Fresno ceanothus	–/–/–/4.3	CNPS	Rhamnaceae	perennial evergreen shrub	(Apr)May–Jul	2,955–7,250	Cismontane woodland and lower montane coniferous forest	No, not located in or adjacent to Project Area
Claytonia parviflora ssp. *grandiflora*	streambank spring beauty	–/–/–/4.2	CNPS	Montiaceae	annual herb	Feb–May	820–3,935	Rocky areas in cismontane woodland	No, not located in or adjacent to Project Area
Crocanthemum suffrutescens	Bisbee Peak rush-rose	–/–/–/3.2	CNDDB, CNPS	Cistaceae	perennial evergreen shrub	Apr–Aug	245–2,200	Often gabbroic or Ione soil, and burned or disturbed areas in chaparral	Yes, located in Project Area
Delphinium hansenii ssp. *ewanianum*	Ewan's larkspur	–/–/–/4.2	CNPS	Ranunculaceae	perennial herb	Mar–May	195–1,970	Rocky areas in cismontane woodland, and valley and foothill grassland	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Eriogonum tripodum	tripod buckwheat	–/–/–/4.2	CNPS	Polygonaceae	perennial deciduous shrub	May–Jul	655–5,250	Often serpentinite areas in chaparral and cismontane woodland	No, not located in or adjacent to Project Area
Eriophyllum jepsonii	Jepson's woolly sunflower	–/–/–/4.3	CNPS	Asteraceae	perennial herb	Apr–Jun	655–3,365	Sometimes serpentinite areas in chaparral, cismontane woodland, and coastal scrub	No, not located in or adjacent to Project Area
Eryngium pinnatisectum	Tuolumne button-celery	–/–/–/1B.2	CNDDB, CNPS	Apiaceae	annual/perennial herb	May–Aug	230–3,000	Mesic areas in cismontane woodland, lower montane coniferous forest, and vernal pools	No, not located in or adjacent to Project Area
Githopsis pulchella ssp. *serpentinicola*	serpentine bluecup	–/–/–/4.3	CNPS	Campanulaceae	annual herb	May–Jun	1,050–2,000	Loam and serpentinite in cismontane woodland	No, not located in or adjacent to Project Area
Hesperocyparis bakeri	Baker cypress	–/–/–/4.2	CNPS	Cupressaceae	perennial evergreen tree	N/A	2,690–6,545	Serpentinite or volcanic aeras in chaparral and lower montane coniferous forest	No, not located in or adjacent to Project Area
Iris longipetala	coast iris	–/–/–/4.2	CNPS	Iridaceae	perennial rhizomatous herb	Mar–May(Jun)	0–1,970	Coastal prairie, lower montane coniferous forest, and meadows and seeps	No, not located in or adjacent to Project Area
Jepsonia heterandra	foothill jepsonia	–/–/–/4.3	CNPS	Saxifragaceae	perennial herb	Aug–Dec	165–1,640	Cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Leptosiphon ambiguus	serpentine leptosiphon	–/–/–/4.2	CNPS	Polemoniaceae	annual herb	Mar–Jun	395–3,710	Rocky and metamorphic areas in cismontane woodland, coastal scrub, and valley and foothill grassland	No, not located in or adjacent to Project Area
Lilium humboldtii ssp. *humboldtii*	Humboldt lily	–/–/–/4.2	CNPS	Liliaceae	perennial bulbiferous herb	May–Jul(Aug)	295–4,200	Openings in chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area
Primula pauciflora	beautiful shootingstar	–/–/–/4.2	CNPS	Primulaceae	perennial herb	Apr–Jun	3,280–7,810	Mesic areas in Great Basin scrub, meadows and seeps, and pinyon and juniper woodland	No, not located in or adjacent to Project Area
Sagittaria sanfordii	Sanford's arrowhead	–/–/–/1B.2	CNDDB, CNPS	Alismataceae	perennial rhizomatous herb (emergent)	May–Oct(Nov)	0–2,135	Marshes and swamps	No, not located in or adjacent to Project Area
Trichostema rubisepalum	Hernandez bluecurls	–/–/–/4.3	CNPS	Lamiaceae	annual herb	Jun–Aug	985–4,710	Volcanic, serpentinite, or gravelly areas in broadleafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest, and vernal pools	No, not located in or adjacent to Project Area

Scientific name	Common name	Status[2] Federal/ State/ BLM/CRPR	Scoping source	Family	Lifeform	Blooming period[3]	Elevation range (feet)[3]	Habitat associations[3]	Potential to be impacted by the Project?
Viburnum ellipticum	oval-leaved viburnum	–/–/–/2B.3	CNDDB, CNPS	Adoxaceae	perennial deciduous shrub	May–Jun	705–4,595	Chaparral, cismontane woodland, and lower montane coniferous forest	No, not located in or adjacent to Project Area

[1] Project vicinity is defined as the USGS 7.5' quadrangle in which the Project is located (Shingle Springs) and the surrounding quadrangles (Pilot Hill, Coloma, Garden Valley, Placerville, Fiddletown, Latrobe, Folsom SE, and Clarksville).

[2] Status:

Federal
FE Federally listed as endangered
FT Federally listed as threatened
– No federal status

State
CE California State listed as endangered
CR California State listed as rare
CT California State listed as threatened
– No state status

BLM
BLMS BLM Sensitive

California Rare Plant Rank
1B Plants rare, threatened, or endangered in California and elsewhere
2B Plants rare, threatened, or endangered in California but more common elsewhere
3 Plants about which more information is needed
4 Plants of limited distribution, a watch list

CNPS Threat Ranks:
0.1 Seriously threatened in California (over 80% of occurrences threatened; high degree/immediacy of threat)
0.2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree/immediacy of threat)
0.3 Not very threatened in California (less than 20% of occurrences threatened; low degree/immediacy of threats or no current threats known).

[3] From CNPS 2021 unless otherwise noted.

Appendix J
2022 USFWS Letter Concurring with the Determinations of the 2022 Biological Evaluation/Assessment for Botanical Resources in the Pine Hills Preserve

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846
SFWO_mail@fws.gov

In Reply Refer to:
2022-0032853-S7-001

May 5, 2022

Ethan Koenigs
Project Manager
Sacramento Municipal Utility District
3995 Old Carson Road,
Pollock Pines, CA 95726
ethan.koenigs@smud.org

Subject: Informal Consultation on the Proposed Herbicide Vegetation Management project within Pine Hill Preserve, El Dorado County, California

Dear Ethan Koenigs:

This letter is in response to the Sacramento Municipal Utility District's (SMUD) March 3, 2022, request for concurrence from the U.S. Fish and Wildlife Service (Service) that the proposed Herbicide Vegetation Management project within Pine Hill Preserve (proposed project) may affect, but is not likely to adversely affect the federally threatened Layne's butterweed (*Senecio layneae*) and the federally endangered El Dorado bedstraw (*Galium californicum* ssp. *sierrae*). The federal action on which we are consulting is the use of herbicide for vegetation management within SMUD's transmission line right of way (ROW) at Pine Hill Preserve, managed by the Bureau of Land Management (BLM). The Federal Energy Regulatory Commission (FERC) designated SMUD as the non-federal lead for the Upper American River Project in a letter dated January 7, 2002. The proposed project is located in El Dorado County, California. There is no proposed or designated critical habitat in the proposed action area. This response is provided under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.) (Act), and in accordance with the implementing regulations pertaining to interagency cooperation (50 CFR 402).

We have reviewed the proposed project, including: (1) the March 3, 2022, correspondence to the Service requesting informal consultation; (2) the *Biological Assessment for Botanical Resources* (Biological Assessment) dated February 2022; (3) the April 6th site visit to the Penny Lane Parcel (4) additional information provided by SMUD and BLM regarding the location of the two plants; and (5) the best available science on the species and its habitat.

SMUD proposes to use several herbicides for vegetation management within the project area in addition to the manual vegetation treatment methods that are currently allowed in the Vegetation and Invasive Weeds Management Plan (VIWMP). The VIWMP is a management plan that guides invasive weed management within the FERC boundary for SMUD's Upper American River Hydropower Project. SMUD has determined that current manual vegetation methods are not sufficient to effectively and efficiently remove undesired non-native vegetation along the transmission line ROW and therefore herbicide use is necessary. The action area consists of 11.45 acres which follows the transmission line ROW through the Penny Lane Parcel (approximately 160 acres) within the Pine Hill Preserve. Multiple application methods and herbicides will be used depending on the purpose and timing of the application. Currently, herbicide use for the proposed project is allowed in all other areas of the FERC boundary per the VIWMP and SMUD is proposing to add herbicide use to the Pine Hill Preserve. A full description of the herbicides, application methods, and adjuvants proposed can be found on page 11 of the Biological Assessment.

The proposed project falls within the range of the Layne's butterweed. Within the Penny Lane Parcel, there is approximately 70 acres of suitable Lanye's butterweed habitat, and several hundred plants are found on this parcel. A 2021 survey of the 11.45-acre project area documented a total of 0.61 acres of Layne's butterweed, mostly on the most western and eastern portions of the project area. The proposed project also falls within the range of El Dorado bedstraw which is found approximately 173.8 feet north of the action area. This El Dorado bedstraw occurrence is about 1 acre (approximately 300 plants) in size, based on surveys conducted in 2021.

In order to avoid adverse effects to both Layne's butterweed and El Dorado bedstraw, SMUD will implement the following conservation measures. SMUD worked closely with the BLM botanist to develop these measures.

1. Prior to herbicide treatments, SMUD will flag occurrences of BLM-sensitive plant species, including Layne's butterweed and El Dorado bedstraw.

2. Appropriate buffer distances will be determined in consultation with BLM each year prior to herbicide applications in consideration of the proposed application method and site-specific conditions.

3. Herbicide applications will be done via the most selective methods possible. Pre-emergent and broadcast backpack treatments will not be used indiscriminately to eliminate all vegetation within large areas; instead, they will be used to inhibit germination and growth of target species only.

4. Colorants will be used in each herbicide mixture to indicate application locations, ensuring proper coverage of only target species.

5. Selective application methods will be used instead of indiscriminate broadcast methods that have increased likelihood of herbicide drift.

6. Herbicide applications will be performed only during favorable weather conditions (i.e., less than 30% change of precipitation and sustained winds less than 5 MPH) and no herbicide application will occur if rain is predicted within 24 hours of the time of spraying

7. Annual employee awareness training will be implemented to ensure that all SMUD personnel are appropriately informed about environmental protection measures. This includes educating crews about sensitive biological resources.

8. Measures to control pesticide drift during spray application will include but are not limited to:

    a. Using ground-based application equipment,

    b. Using spray nozzles that produce 350 micron or greater droplets,

    c. Using nozzle pressures below 25 PSI (pounds per square inch) on backpacks,

    d. Using spray nozzles no higher than 2 feed from the ground, and

    e. Using ground application directed away from non-target vegetation.

9. A Pest Control Advisor (PCA) and BLM qualified pesticide applicator will be present on site to oversee herbicide application within the Preserve.

10. SMUD will notify BLM, the Service, and California Department of Fish and Wildlife (CDFW) prior to vegetation treatment to discuss proposed methods and any specific concerns.

11. Proposed application methods and timing will consider potential non-target effects (e.g., spraying prior to bloom time to minimize potential effects on native pollinators).

12. Pest Control Operators will conduct as few treatments as possible, since the act of entering the area to be treated may itself have the most significant potential for impacts to the plants. Treating an area once with an herbicide with a slightly higher potential for impact may have less overall impact than multiple applications with a lower-impact herbicide.

13. Herbicide application would adhere to all herbicide label directions and applicable laws and measures will be implemented by the PCA to ensure safe transport, mixing, and loading of herbicides.

14. Application of herbicide containing glyphosate will only be used if the formulation of the product does not contain surfactant.

A complete list of conservation measures can be found on pages 6-9 and 19-20 of the Biological Assessment.

Vegetation removal will benefit both Layne’s butterweed and El Dorado bedstraw as both plant species thrive in an early successional environment and require habitat disturbance so they are not outcompeted by taller chaparral species. Many areas of the Pine Hill Preserve contain invasive plant species that out compete the native gabbro soil dependent plants. Layne’s butterweed is currently thriving in transmission line ROWs where non-native vegetation is routinely removed, and this species will benefit from additional vegetation management. Although not currently known to occur within the ROW, El Dorado bedstraw may become established in cleared areas in the future.

After reviewing all available information, the Service concurs with your determination that the proposed project *may affect, but is not likely to adversely affect* Layne’s butterweed and El

Dorado bedstraw. The above conservation measures, when properly implemented, will avoid potential adverse effects to these two listed plant species. The reduction of non-native invasive plants along the ROW will also benefit these listed species in the long-term by increasing the amount of available habitat for these species. Therefore, unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered, or a new species is listed or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Act is necessary.

If you have any questions regarding this correspondence for the proposed Herbicide Vegetation Management project within Pine Hill Preserve, please contact Chloe Hansum, Fish and Wildlife Biologist, (chloe_hansum@fws.gov) at (916) 414-6590 or myself (richard_kuyper@fws.gov) at (916) 414-6621 or at the letterhead address.

Sincerely,

Rick Kuyper
Sierra-Cascades Division Supervisor

ec:
Graciela Hinshaw, BLM, El Dorado Hills, CA
Darold Perry, SMUD, Pollock Pines, CA