Biological Report

Lake Shastina Community Services
Infrastructure Improvement Project
Lake Shastina, California

Prepared for:

Lake Shastina Community Services

February 2023

520022.500

Phone: (707) 822-5785 Email: info@shn-engr.com
Web: shn-engr.com • 1062 G Street, Ste. I, Arcata, CA 95521-5800

Biological Report

Lake Shastina Community Services Infrastructure Improvement Project Lake Shastina, California

Prepared for:
Lake Shastina Community Services

Prepared by:

350 Hartnell Ave. Suite B
Redding, CA 96002-1875
530-221-5424

February 2023

QA/QC: ___
Reference: 520022.500

Table of Contents

Appendices

List of Illustrations

Figures **Follows Page**

Abbreviations and Acronyms

Units of Measure

F	Fahrenheit
ft	feet
km	kilometer
m	meter

Additional Terms

APN	Assessor's Parcel Number
BIOS	Biogeographical Information and Observation System
BMP	best management practices
C	candidate
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CT	candidate threatened species status
CWA	Clean Water Act
D	delisted species status
DPS	distinct population segment/species status
E	endangered species status
EPA	United States Environmental Protection Agency
ESU	evolutionarily significant unit/species status
FESA	Federal Endangered Species Act
FP	fully protected species status
G	Global
G1/S1	critically imperiled species heritage rank
G2/S2	imperiled species heritage rank
G3/S3	vulnerable species heritage rank
G4/S4	apparently secure species heritage rank
G5/S5	secure species heritage rank
GIS	Geographic Information Systems
IPaC	Information for Planning and Conservation
LSA	Lake and Streambed Alteration
LSCSD	Lake Shastina Community Services District
MBTA	Migratory Bird Treaty Act
NCCP	Natural Community Conservation Planning
NEPA	National Environmental Policy Act
NL	not listed
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

Abbreviations and Acronyms (cont'd)

NPPA	Native Plant Protection Act
NT	Near threatened species status
PT	proposed threatened species status
RWQCB	Regional Water Quality Control Board
S	State
SSC	species of special concern
SWRCB	State Water Resources Control Board
T	threatened species status
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VegCAMP	Vegetation Classification and Mapping Program
WDR	Waste Discharge Requirement
WL	watch list species status

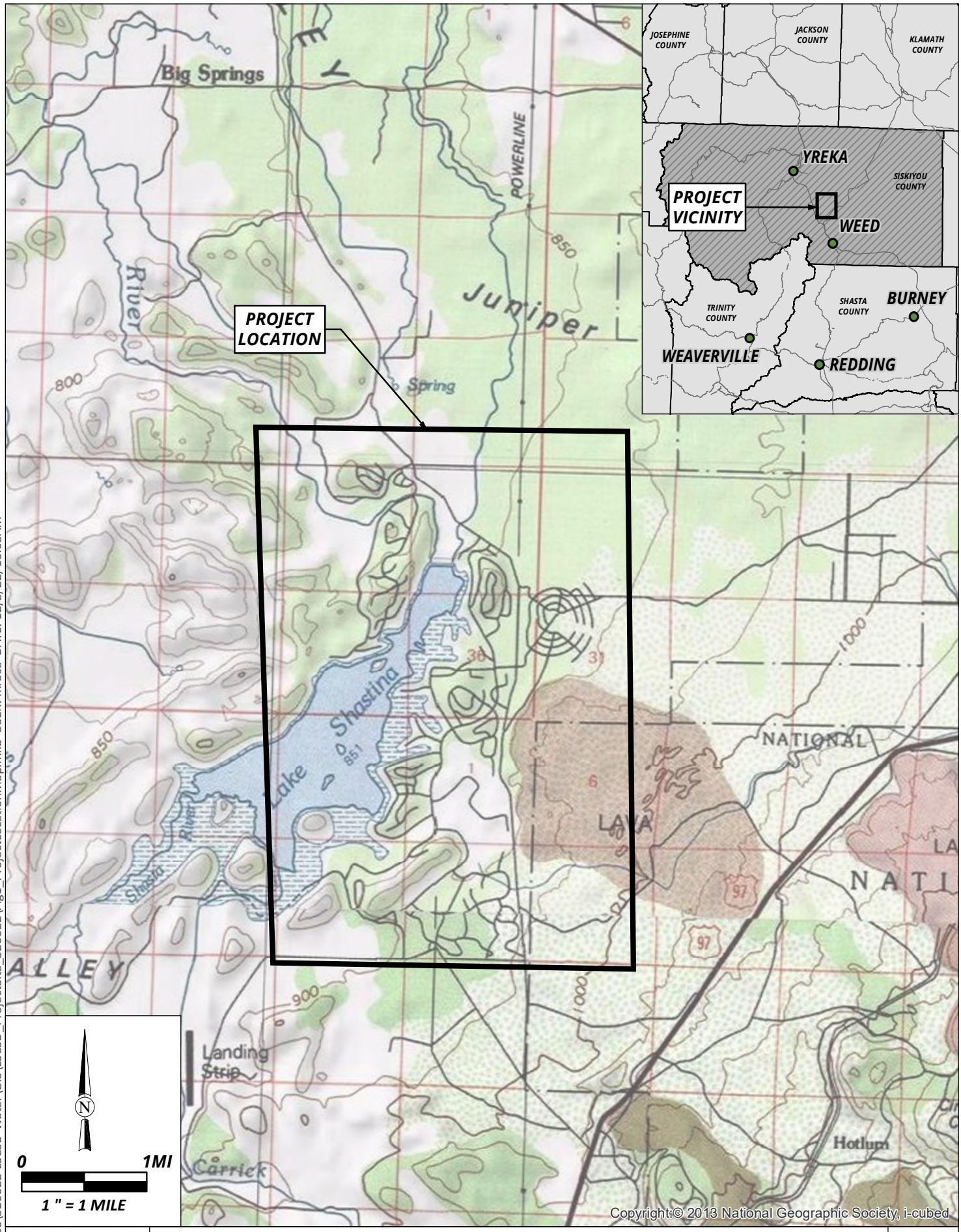
1.0 Introduction

SHN has conducted literature review, special-status animal species surveys, and habitat assessments to determine biological resources present and potential to occur in the vicinity of the Lake Shastina Community Services District (LSCSD) upgrades to their water meters, fire hydrants, water tanks, wells, and construction of one small pump station. This Biological Report is intended to provide biological resources information for planning and permitting purposes. Fieldwork was performed by an SHN staff biologist with over five years of experience.

1.1 Project Location

The project is located approximately five miles northeast of Weed, California, and 300 feet west of A29/Big Springs Road within Siskiyou County (Figure 1). The study area is in Township 43 North, Range 5 West, Sections 1, 2, 11, 12, 25, 26, 31, 35, and 36, Mount Diablo Meridian. The proposed activities are located within the following Assessor's Parcel Numbers (APNs) along with a brief description of the locations:

- Water tank 4 location APN: 020-071-270-000, LSCSD owned, Dead end of Tennis Court. See Appendix 1, Photo 4.
- Water tank 3 location APN: 108-200-120-000, LSCSD owned, Legal Description: Unit 9-2 Lot 238 Lake Shastina, west side of Stone Crest Drive near the southern dead end. See Appendix 1, Photo 3.
- Water tank 2 location APN: 106-380-450-000, LSCSD owned, Legal Description: Unit 4 Por Stag St & Deer Mtn Rd Lot 43 Lake Shastina, where Stag Street and Stag Mountain Road split. See Figure 2 and Figure 3-1.
- Water tank 1 location APN: 106-190-150-000, LSCSD owned, Legal Description: Unit 3 Par F Lake Shastina, Juniper Peak Rd is to the west and Windmill Dr is to the east. See Figure 2 and 3-1.
- Test Well 12 site location APN: 020-071-430-000, private resident, where Lake Shore Drive and Cottonwood Drive meet up and end. See Appendix 1, Photo 5, and Figure 2.
- Test Well 11 site location APN: 020-280-280-000, LSCSD owned, where Lake Shore Drive meets Big Springs Rd on the north side of the lake, the parcel is north east by 0.03 miles. See Figure 2.
- Place a temporary water tank outside of pump station 53 on APN: 107-080-270-000, LSCSD owned, legal description: Unit 5 Lots 8 & 9 One OR 98 9949 Lake Shastina. See Appendix 1, Photo 1 and Figure 2.
- New pump station would be placed where the demolished pump station #52 use to be (near fire hydrant 190): APN: 107-450-550-000 (east side of Elk Trail Rd), LSCSD owned, Legal description: Unit 7-2 Incl Por Puma Dr Cottontail Dr Elk Trail & All Fox Ct Lake Shastina See Appendix 2, Photo 10 and Figure 3.
- 319 fire hydrant replacements throughout the project area within Township 43 North, Range 5 West, sections 35, 26, 25, 31, 36, 1, 12, 11, 2, Mount Diablo Meridian, Siskiyou county. See Figure 4.



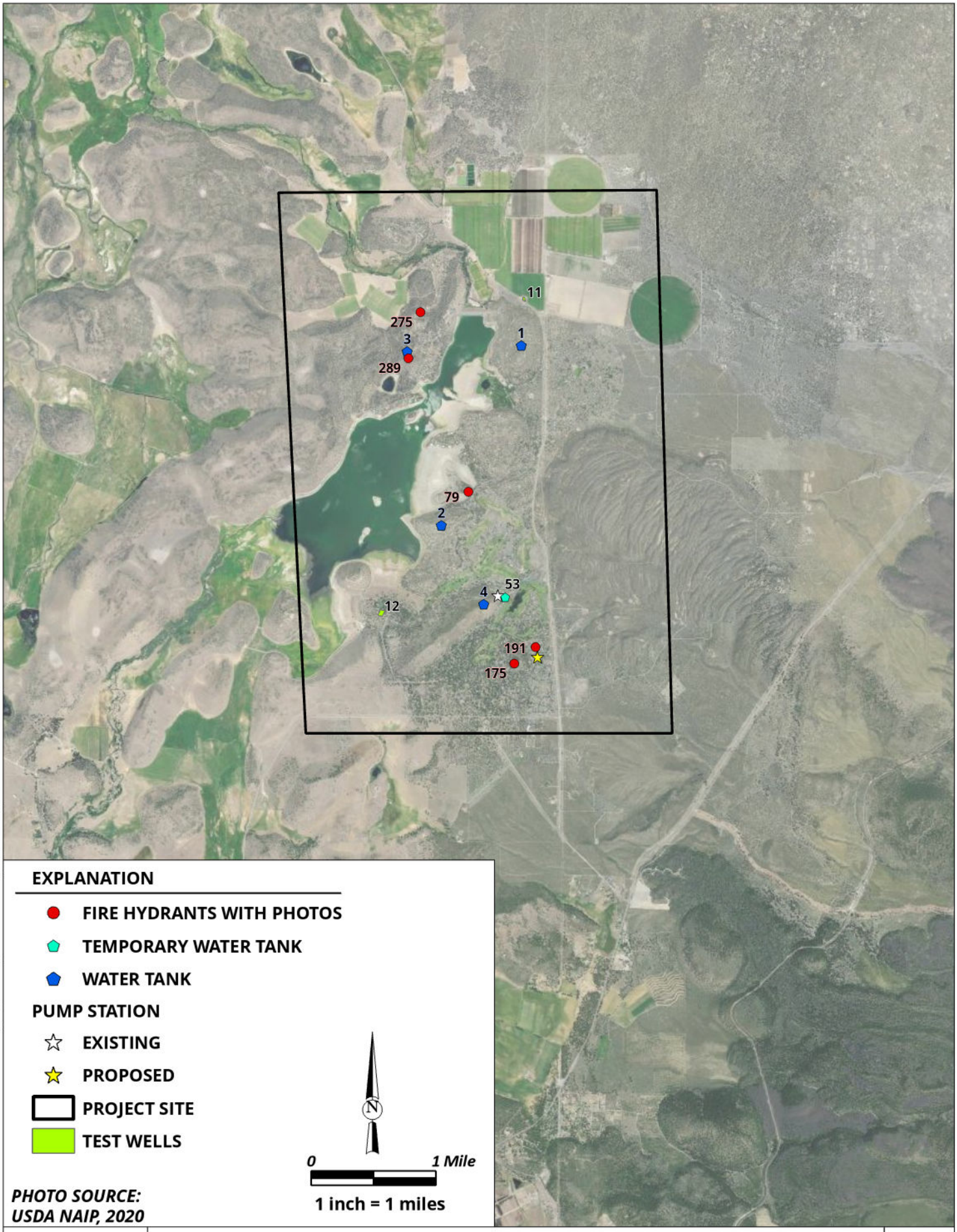
P:\Redding\2020\520022-LSCSD-Water\GIS\LSCSD_ProjectSite_520022\Fig1_ProjectLocationMap.mxd USER: mrose DATE: 12/8/22, 10:08AM

Lake Shastina Community Services
Infrastructure Improvements Biological Report
Weed, California

Project Location Map

December 2022 - 520022

Figure 1



EXPLANATION

- FIRE HYDRANTS WITH PHOTOS
- TEMPORARY WATER TANK
- WATER TANK

PUMP STATION

- EXISTING
- PROPOSED
- PROJECT SITE
- TEST WELLS

N

0 1 Mile

1 inch = 1 miles

PHOTO SOURCE: USDA NAIP, 2020

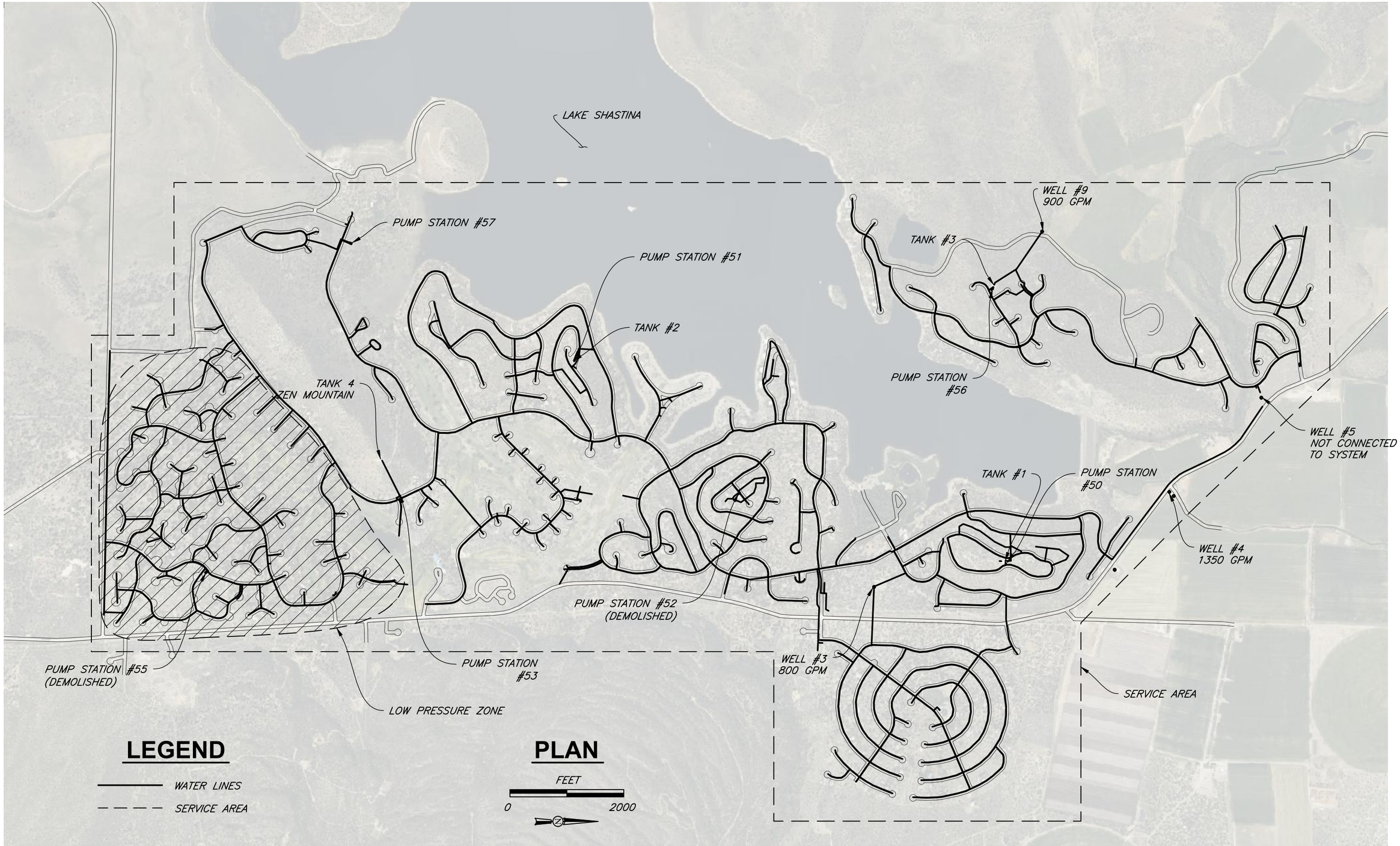
P:\Redding\2020\520022-LSCSD-Water\GIS\LSCSD_ProjectSite_520022\LSCSD_ProjectSite_520022.mxd USER: jblankenship DATE: 2/10/23, 1:17PM

Lake Shastina Community Services District
Biological CEQA Assessment
Weed, California

Utility Upgrades and Construction

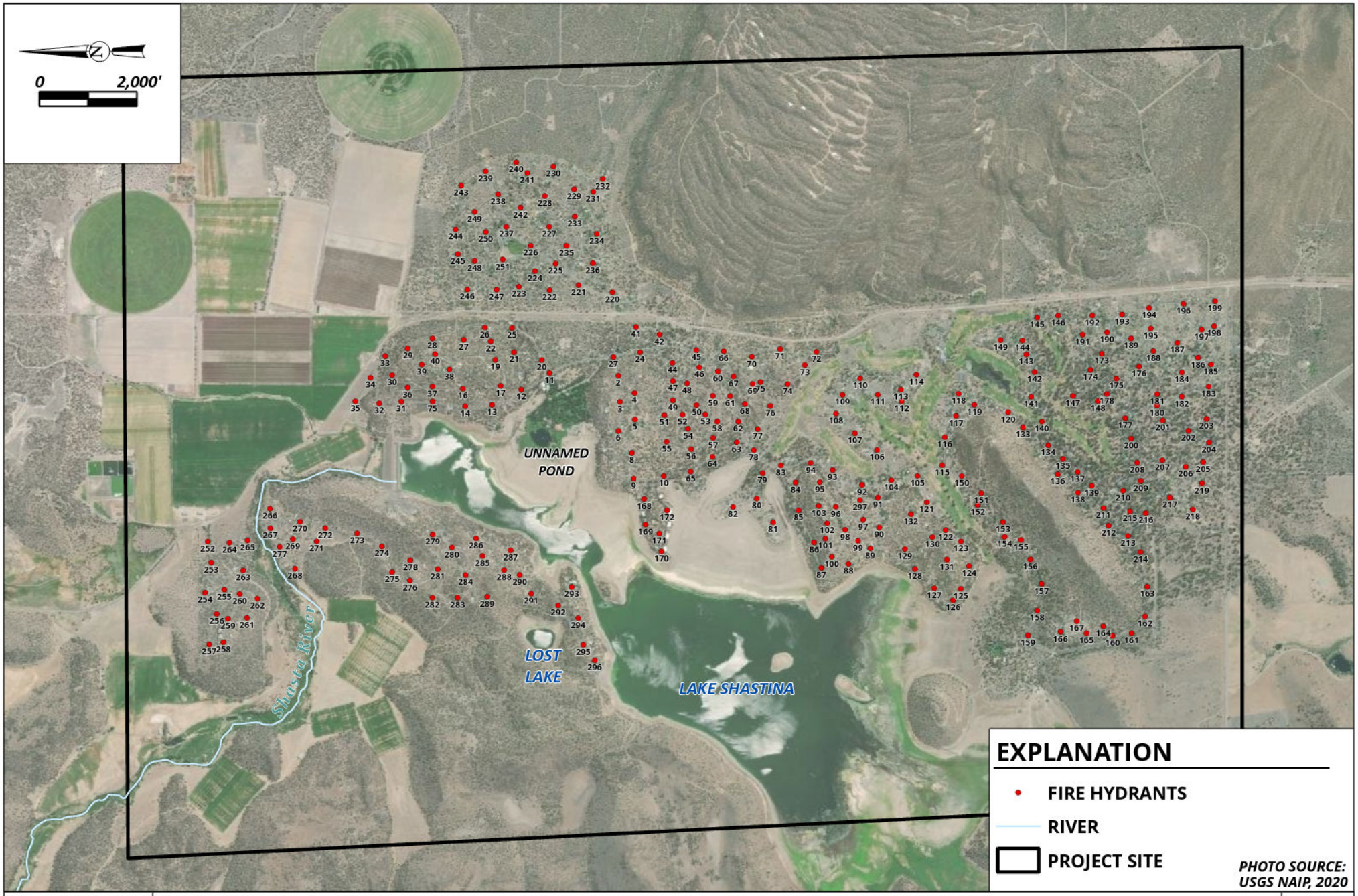
February 2023 - 520022

Figure 2



SHN	Lake Shastina CSD Drinking Water System Improvements Lake Shastina, CA	Existing Conditions SHN 520022	
	August 2021	520022-LSCSD-FIGS	Figure 3-1

P:\Redding\2020\520022-LSCSD-Water\GIS\LSCSD_ProjectSite_520022\LSCSD_ProjectSite_520022.mxd USER: jblankenship DATE: 12/28/22, 3:23PM



Lake Shastina Community Services District
Biological CEQA Assessment
Weed, California

Fire Hydrant Upgrades

December 2022 - 520022

Figure 4

1.2 Project Description

LSCSD is planning to make upgrades to all water meters and fire hydrants throughout the project site. The water meters will be replaced with automatic sensor meters and no ground disturbance will be required at these locations. The fire hydrants will need to be replaced to the elbow joint in the ground. Soil disturbance within 10 feet of each fire hydrant and a few inches of depth is expected with the use of a backhoe and hand tools, within negligible vegetation or bare ground (See Figure 4).

- LSCSD proposes to make upgrades to water tanks 1, 2, 3, and 4. Water tanks 1, 2, and 3 will be painted and water tank 4 will be replaced with a larger tank to keep up with the water demands of the area. A crane and truck will be used to move and transport water tanks. Pump station 53 will house a temporary water tank outside of the pump station while tank 4 is being replaced (See Figure 2).
- A new test well 12 will be drilled (on APN 020-280-280-000; See Figure 2).
- A new test well 11 will be drilled next to existing test wells (on APN 020-280-280-000).
- A new pump house station will be constructed (on APN 107-450-550-000) to allow better water pressure to residents in that area. Soil disturbance and minor vegetation removal by using a backhoe and hand tools within 20 feet of the area will occur.

This plan will not involve vegetation or soil disturbance within 50 feet of a stream or drainage and will not have hydrological impacts to any adjacent jurisdictional (Regional Water Quality Control Board [RWQCB] or California Department of Fish and Wildlife [CDFW]) features. Minor soil disturbance would be required at several locations that vary from 170 feet to 5,000 feet away from the riparian habitat to replace fire hydrants, water tank 4, and the new pump house station.

1.3 Site Description

The study area is situated between approximately 2,680 and 3,230 feet (ft) above the mean sea level, with the highest elevations represented at the most south eastern corner of the study area where Jackson Ranch Road and A29/Big Springs Road meet. The residential areas that surround half of Lake Shastina was created because of the construction of the Dwinnell Dam with Shasta River flowing north from the north tip of the lake. The residential area within the study area has been under development for the past 54 years with road, underground power, water, and sewage improvements brought to the area to house around 2,400 residents. The habitat within the project area consists of rural residential development with managed landscapes. The areas not landscaped with fescue grasses and maples are sparse shrubs consisting of rabbitbrush (*Chrysothamnus* sp.) and manzanita (*Arctostaphylos* sp.), mixed with Western juniper (*Juniperus occidentalis*) and ponderosa pine (*Pinus ponderosa*).

2.0 Methods

2.1 Literature Review

This Biological Report includes a review of pertinent literature on habitat characteristics of the site, and a review of information related to special-status plant and animal species that could potentially use the described habitats.

The findings for this report are a result of several sources, including a review of existing literature regarding sensitive resources that have the potential to occur within the site. Resources for this determination included:

- California Natural Diversity Database (CNDDB) query for the Lake Shastina and surrounding United States Geological Survey (USGS) 7.5-minute topographic quadrangles (Lake Shastina, Juniper Flat, Gazelle, Montague, Little Shasta, Solomons Temple, China Mountain, Weed, and Hotlum; CDFW, 2022a)
- Biogeographical Information and Observation System (BIOS; CDFW, 2022b)
- Electronic Inventory of Rare and Endangered Vascular Plants of California (California Native Plant Society [CNPS], 2022a), queried for a list of all botanical species reported for the Lake Shastina and surrounding USGS 7.5-minute topographic quadrangles
- Special Animals of California List (CDFW, 2022c)
- United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) was queried for threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and/or may be affected by the proposed project (USFWS, 2022a)
- USFWS Critical Habitat Mapper (USFWS, 2022b)

From the database queries, a list of potential target species for the study area was compiled. Tables 1 and 2 in Appendix 2 include botanical and animal species reported by the CNDDB and USFWS, and species listed in the CNPS inventory of rare plants.

2.2 Field Observations and Studies

An SHN biologist conducted a site visit on June 22, 2022 for biological surveys and habitat assessments. A total of seven hours of surveying occurred. A survey was conducted to identify all species present within the project-related study areas, including possible special-status species. In addition to surveying for target species, lists of all botanical and animal species encountered were compiled and included in Appendix 3. As this field visit was reconnaissance level, the survey was not conducted according to CDFW protocol as outlined in *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities* (CDFW, 2018). Pre-construction protocol surveys are included in Section 7 Recommendations.

Site photographs from the site visit are included in Appendix 1.

3.0 Environmental Setting

The average annual 29 years precipitation data from the Mount Shasta Area from 1991 to 2020 is 36.03 inches (National Oceanic and Atmospheric Administration [NOAA], 2022) with most precipitation occurring between November and April. Temperatures in the Lake Shastina range from an average low of 28 degrees Fahrenheit (F) in December to an average high of 85 F in July; extremes in temperatures are relatively uncommon.

3.1 Hydrology

The project location is within the Shasta River watershed (hydrologic unit code 18010207; See Figure 4). Snowmelt from Mount Shasta contributes significantly to surface runoff and groundwater hydrology. Water from melted snow percolates down through porous volcanic rocks and flows subsurface, eventually emerging as springs and seeps on the valley margin or floor. (Normandeau Associates, Inc.,

2022). The study area contains four hydrology types: one lake (Lake Shastina), two freshwater ponds, and one river (Shasta River). Lake Shastina is a 1,613.31-acre lake that is classified as L1UBHh (lacustrine, limnetic, unconsolidated bottom, permanently flooded, and diked). Lost Lake, which is one of the freshwater ponds, is 10.41 acres and situated 0.28 miles west of Lake Shastina and is classified as a PABG (palustrine, aquatic bed, and intermittently exposed). The unnamed freshwater pond that is located within the northeast mouth of Lake Shastina, is 2.94 acres and classified as a PABGx (palustrine, aquatic bed, intermittently exposed, and excavated). The Shasta River enters Lake Shastina in the southwest corner and flows/exists through the riverine north of Lake Shastina. After 0.5 miles due north, the river flows northwest towards the Klamath River. Shasta River has various classifications within the study area that include R3UBH (riverine, upper perennial, unconsolidated bottom, permanently flooded), PEM1C (palustrine, emergent, persistent, seasonally flooded), PSSC (palustrine, scrub-shrub, seasonally flooded), PEM1A (palustrine, emergent, persistent, and temporary flooded), PEM1Ch (palustrine, emergent, persistent, seasonally flooded, diked), and PFOC (Palustrine, forested, and seasonally flooded) (USFWS, 2022c).

Lake Shastina has a large seepage rate to the groundwater basin beneath the Shasta River to the northwest. The Montague canal from Lake Shastina also has a high seepage rate (estimated as 25% of the canal flow) that recharges the groundwater between Lake Shastina and Montague. There is also considerable recharge from the irrigated pastures and alfalfa fields in other parts of Shasta Valley (CDFW, 2022e).

3.2 Geology and Soils

Geology within the location is a terrain built on deposits of lava flow from the eruption of ancestral Mt. Shasta, with slopes between 0 and 65 percent in the study area. The lava flows also developed the small hills just east of U.S. Highway 5 that spans from Weed to Yreka. To the west of U.S. Highway 5 are the Klamath Mountains, which comprise of ocean floor crust and sediment. Mount Shasta can be seen to the south east of Weed and has developed during the past 250,000 years in a series of eruptive episodes (Christiansen et al., 2017). The top three soils within the project area consist of Delaney sand, Delaney gravelly sand, and Mary-Rock outcrop complex. (See Appendix 4 Soils Map; United States Department of Agriculture [USDA]-Natural Resources Conservation Service [NRCS], 2022; McLaughlin and Harradine, 1965). Delaney sand (129), which occurs on 0 to 9 percent slopes and is somewhat excessively drained, Delaney gravelly sand (130) occurs on 0 to 9 percent slopes and is somewhat excessively drained, and Mary-Rock (188) outcrop complex which occurs on 2 to 50 percent slopes are well drained. The 18 different soil types within the study area range from very poorly drained (Gazelle silt loam) to excessively drained (rock outcrop and Lithic Haploxerolls-Rock outcrop complex; Hirt, 1995). The soils support residential homes, agricultural fields, a lake, ponds, rivers, scrub-shrub, mixed-conifer, and rocky outcrop habitats.

3.3 Vegetation

Vegetation composition varies across the study area. On the east side of the study area is cultivated crop land of alfalfa hay. The southeast portion of the study area contains the majority of the scrub-shrub habitat, consisting of rabbitbrush and manzanita. The subdivision residential areas around the lake are mixed with ponderosa pine, western juniper, and rocky outcrops surrounding Lake Shastina. The northern part of the study area contains Shasta River, which creates willow (*Salix*) and wetland habitats.

3.4 Wildlife Habitats

Common wildlife species expected on the site are those associated with northern California disturbed residential areas with small parcels of wet meadows, willow, ponderosa pine, western juniper, manzanita, and rabbitbrush. Lake Shastina provides foraging opportunity for special-status birds such as Osprey and Bald Eagle. Osprey were observed during the June 22, 2022 visit in the northern area near the Shasta River. No osprey nests were observed. Bald Eagles were not observed, nor bald eagle nests during the first assessment. Other wildlife species observed at the site included the Canada Goose (*Branta canadensis*), American goldfinch (*Spinus tristis*), Turkey vulture (*Cathartes aura*), Black-capped chickadee (*Poecile atricapillus*), and California scrub jay (*Aphelocoma californica*), among others (see Appendix 3, Table 1). Other wildlife species are likely to inhabit the surrounding area and it is expected that there are many other bird, mammal, and amphibian species that might use the project site, if only transitionally (see Appendix 2, Table 1 for special-status species reported within the vicinity). Human activities within the roadside, residential, and public utility portions of the study area may limit the abundance of a variety of birds and animals within those areas. See Section 5.4 for more special-status habitat descriptions observed within the study area.

3.5 Offsite Conditions

Offsite conditions are like those found within the study area; disturbed residential areas with pockets of rabbitbrush-manzanita shrub, ponderosa pine-western juniper evergreen mix, crop land of alfalfa hay, and willows/wetland vegetation in the Shasta River areas.

4.0 Regulatory Setting

Regulatory authority over biological resources is shared by federal, State, and local authorities under a variety of legislative acts. The following section summarizes the federal, State, and local regulations for special-status species, jurisdictional waters of the U.S. and State of California, and other sensitive biological resources. This section provides a listing and overview of these federal, State, and local laws.

4.1 Federal Laws

4.1.1 Clean Water Act Sections 404 and 401

Under Section 404 (33 U.S. Code (USC) 1341) of the Clean Water Act (CWA), as amended, the United States Army Corps of Engineers (USACE) retains primary responsibility for permits to discharge dredged or fill material into waters of the U.S. All discharges of dredged or fill material into jurisdictional waters of the U.S. that result in permanent or temporary losses of waters of the U.S. are regulated by the (U.S. Environmental Protection Agency [EPA], 2008). A permit from the USACE must be obtained before placing fill or grading in wetlands or other waters of the U.S., unless the activity is exempt from CWA Section 404 regulation (for example, certain farming and forestry activities). The USACE defines wetlands as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (Environmental Laboratory, 1987). In other words, the USACE defines wetlands by the presence of all three wetland indicators: hydrophytic vegetation, hydric soils, and wetland hydrology.

Waters of the U.S. are defined in 33 Code of Federal Regulations (CFR) Part 328. They include traditional navigable waters; relatively permanent, non-navigable tributaries of traditional navigable waters; and certain wetlands. Following recent court cases, the EPA and USACE published a memorandum entitled

"Clean Water Act Jurisdiction" (EPA/USACE, 2008) to guide the determination of jurisdiction over waters of the U.S., especially for wetlands. The applicability of Section 404 permitting over discharges to wetlands is, therefore, a two-step process: 1) determining the areas that are wetlands, and 2) where a wetland is present, assessing the wetland's connection to traditional navigable waters and nonnavigable tributaries to determine whether the wetland is jurisdictional under the CWA. A wetland is considered jurisdictional if it meets certain specified criteria. The USACE is required to consult with the USFWS and/or National Marine Fisheries Service (NMFS) under Section 7 of the Federal Endangered Species Act (FESA) if the action subject to CWA permitting could result in "Take" of federally listed species or an adverse effect to designated critical habitat. The project is within the jurisdiction of the San Francisco District of the USACE.

Section 401 of the CWA (33 USC 1341; EPA, 1977) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into waters of the U.S. to obtain a certification from the state in which the discharge originates or would originate, or if appropriate, from the interstate water pollution control agency having jurisdiction over the affected waters at the point where the discharge originates or would originate, that the discharge will comply with the applicable effluent limitations and water quality standards. A certification obtained for the construction of any facility must also pertain to the subsequent operation of the facility. The responsibility for the protection of water quality in California rests with the State Water Resources Control Board (SWRCB) and its nine RWQCBs. The project is within the jurisdiction of the North Coast RWQCB.

4.1.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC Sections 661-667e, as amended, 1958, 1978, 1994, and 1995) requires that whenever waters, the channel of a stream, or other body of water are proposed or authorized to be modified by a public or private agency under a federal license or permit, the federal agency must first consult with the USFWS and/or NMFS and with the head of the agency exercising administration over the wildlife resources of the state where construction will occur (in this case, the CDFW). These guidelines aim at conservation of birds, fish, mammals, and all other classes of wild animals, and all types of aquatic and land vegetation upon which wildlife is dependent (USFWS, 1934). If direct permanent impacts occur to waters of the U.S. from a proposed project, then a permit from USACE under CWA Section 404 is required for the construction of the proposed project. USACE is required to consult with USFWS and/or NMFS as appropriate regarding potential impacts to federally-listed species under FESA. Such action may prompt consultation with CDFW, which would review the project pursuant to California Endangered Species Act (CESA) and issue a consistency letter with USFWS and/or NMFS, if required.

4.1.3 Federal Endangered Species Act

The United States Congress passed the FESA in 1973 to protect species that are endangered or threatened with extinction (USACE/EPA, 1973). The FESA is intended to operate in conjunction with the National Environmental Policy Act (NEPA) to help protect the ecosystems upon which endangered and threatened species depend and within which they live. The USFWS and the NMFS are the designated federal agencies responsible for administering the FESA. The FESA prohibits the "Take" of endangered or threatened wildlife species. A "Take" is defined as harassing, harming (including significantly modifying or degrading habitat), pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting wildlife species, or any attempt to engage in such conduct (16 USC 1531, 50 CFR 17.3). An activity can be defined as a "Take" even if it is unintentional or accidental. Taking can result in civil or criminal penalties. Activities that could result in "Take" of a federally-listed species require an incidental "Take"

authorization resulting from FESA Section 7 consultation or FESA Section 10 consultation. Plants are legally protected under the FESA only if "Take" occurs on federal land or from federal actions, such as, issuing a wetland fill permit. A federal endangered species is one that is considered in danger of becoming extinct throughout all, or a significant portion, of its range. A federal threatened species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of species proposed for listing as threatened or endangered. Proposed species are those for which a proposed rule to list as endangered or threatened has been published in the Federal Register. In addition to endangered, threatened, and proposed species, the USFWS maintains a list of candidate species. Candidate species are those for which the USFWS has on file sufficient information to support issuance of a proposed listing rule.

Pursuant to the requirements of the FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such a species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under the FESA or result in the destruction or adverse modification of critical habitat designated or proposed to be designated for such species (16 USC 1536[3], [4]). Project-related impacts to species on the FESA endangered or threatened list would be considered significant and would require mitigation.

4.1.4 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) of 1918 makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21; USFWS, 1918). The MBTA also prohibits disturbance and harassment of nesting migratory birds at any time during their breeding season. The USFWS is responsible for enforcing the MBTA (16 USC 703). The migratory bird nesting season is generally considered to be between March 15 and August 15 within the study region.

4.2 State Laws

4.2.1 Porter-Cologne Water Quality Control Act

The state and RWQCB also maintain independent regulatory authority over the placement of waste, including fill, into waters of the state under the Porter-Cologne Water Quality Control Act (SWRCB, 1969). Waters of the state are defined by the Porter-Cologne Water Quality Control Act as "any surface water or groundwater, including saline waters, within the boundaries of the state." The SWRCB protects all waters in its regulatory scope but has special responsibility for isolated wetlands and headwaters. These water bodies might not be regulated by other programs, such as, Section 404 of the CWA. Waters of the state are regulated by the RWQCBs under the State Water Quality Certification Program, which regulates discharges of dredged and fill material under Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require an USACE permit, or fall under other federal jurisdiction, and have the potential to impact waters of the state are required to comply with the terms of the Water Quality Certification Program. If a proposed project does not require a federal license or permit but does involve activities that may result in a discharge of harmful substances to waters of the state, the RWQCBs have the option to regulate such activities under their state authority in the form of Waste Discharge Requirements (WDRs) or certification of WDRs.

4.2.2 California Endangered Species Act

The State of California enacted the CESA in 1984 (CDFW, 1984). The CESA is similar **to the FESA, but** pertains to state-listed endangered and threatened species. Under the CESA, the CDFW has the responsibility for maintaining a list of threatened and endangered species designated under state law (California Fish and Game Code [CFGC] 2070; CDFW, 1998). Section 2080 of the CFGC prohibits "Take" of any species that the commission determines to be an endangered or threatened species. "Take" is defined in Section 86 of the CFGC as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

The state and federal lists of threatened and endangered species are generally similar; however, a species present on one list may be absent from the other. CESA regulations are also somewhat different from the FESA in that the California regulations include threatened, endangered, and candidate plants on non-federal lands within the definition of "Take." CESA allows for "Take" incidental to otherwise lawful development projects. Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. Project-related impacts to species on the CESA endangered or threatened list (or, in addition, designated by the CDFW as a Species of Special Concern [SSC], which is a level below threatened or endangered status) would be considered significant and would require mitigation.

4.2.3 Native Plant Protection Act

The Native Plant Protection Act (NPPA; Sec. 1900-1913 of the CFGC) was enacted in 1977 and allows the Fish and Game Commission to designate plants as rare or endangered. The NPPA precedes the CESA. Statewide, there are 64 species, subspecies, and varieties of plants that are protected as rare under the NPPA. The NPPA prohibits take of endangered or rare native plants, but includes some exceptions for agricultural and nursery operations, emergencies, and after properly notifying CDFW for vegetation removal from canals, roads, and other sites, changes in land use, and in certain other situations. Plants listed as rare or endangered under the NPPA should be considered during project review as if they were listed under the CESA. Appendix 2 includes potentially-occurring endangered or rare native plants that may occur in the project area (including CNPS lists).

4.2.4 California Environmental Quality Act

California Environmental Quality Act (CEQA) Guidelines Sections 15125(c) and 15380(d) provide that a species not listed on the federal or State list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria (CNRA, 1970). Thus, CEQA provides the ability to protect a species from potential project impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted. CNPS maintains an inventory of plant species native to California, with populations that are significantly reduced from historical levels, occur in limited distribution, or otherwise are rare or threatened with extinction. This information is published in the Inventory of Rare and Endangered Plants of California (CNPS, 2022a). Taxa with a California Rare Plant Rank (CRPR) of 1A, 1B, 2A, 2B, and 3 in the CNPS inventory consist of plants that are eligible for state listing and meet the definition of Rare or Endangered under CEQA Guidelines Sections 15125(c) and 15380(d). CRPR 4 populations may qualify for consideration under CEQA if they are peripheral or disjunct populations, represent the type of locality of the species, or exhibit unusual morphology and/or occur on unusual substrates. Additionally, CDFW maintains lists of special-status animals and plants. These lists include a species conservation ranking status from multiple sources,

including FESA, CESA, federal departments with unique jurisdictions, CNPS, and other non-governmental organizations. Based on these sources, CDFW assigns a heritage rank to each species according to their degree of imperilment (as measured by rarity, trends, and threats). These ranks follow NatureServe's Heritage Methodology, in which all species are listed with a G (global) and S (state) rank. Species with state ranks of S1-S3 are also considered highly imperiled. CEQA checklist IV(b) calls for the consideration of riparian habitats and sensitive natural communities.

Sensitive vegetation communities are natural communities and habitats that are either unique, of relatively limited distribution in the region, or of particularly high wildlife value. However, these communities may or may not necessarily contain special-status species. Sensitive natural communities are usually identified in local or regional plans, policies, or regulations, or by the CDFW (that is, the CNDDB and Vegetation Classification and Mapping Program [VegCAMP]) or the USFWS. Impacts to sensitive natural communities and habitats must be considered and evaluated under CEQA (California Code of Regulations [CCR]: Title 14, Div. 6, Chap. 3).

Although sensitive natural communities do not (at present) have legal protection, CEQA calls for an assessment of whether any such resources would be affected and requires a finding of significance if there will be substantial losses. High-quality occurrences of natural communities with heritage ranks of 3 or lower are considered by CDFW to be significant resources and fall under the CEQA guidelines for addressing impacts. Local planning documents (such as general plans) often identify these resources as well. Avoidance, minimizations, or mitigation measures should be implemented if project-affected stands of rare vegetation types or natural communities are considered high-quality occurrences of the given community. As a trustee agency under CEQA, CDFW reviews potential project impacts to biological resources, including wetlands. In accordance with the CEQA thresholds of significance for biological resources, areas that meet the state criteria for wetlands and could be impacted by a project must be analyzed. Pursuant to CFGC Section 2785, CDFW defines wet areas as "lands which may be covered periodically or permanently with shallow water and which include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, fens, and vernal pools."

4.2.5 California Fish and Game Code Section 1600

Streams, lakes, and riparian vegetation as habitat for fish and other wildlife species, are subject to jurisdiction by the CDFW under Sections 1600-1616 of the CFGC (CDFW, 1994). Any activity that will do one or more of the following generally require a Lake and Streambed Alteration (LSA) Agreement:

1) Substantially obstruct or divert the natural flow of a river, stream, or lake

2) Substantially change or use any material from the bed, channel, or bank of a river, stream, or lake

3) Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake (CDFW, 1994).

The term "stream," which includes creeks and rivers, is defined in the CCR as, "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life." This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation (14 CCR 1.72; CNRA, 1987).

In addition, the term "stream" can include ephemeral streams, dry washes, watercourses with subsurface flows, canals, aqueducts, irrigation ditches, and other means of water conveyance if they support aquatic life, riparian vegetation, or stream-dependent terrestrial wildlife. Riparian is defined as

"on, or pertaining to, the banks of a stream"; therefore, riparian vegetation is defined as vegetation that occurs in and/or adjacent to a stream and is dependent on, and occurs because of, the stream itself. Removal of riparian vegetation also requires an LSA agreement from CDFW.

4.2.6 California Fish and Game Code Sections 3503 and 3513

According to Section 3503 of the CFGC, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird (except English sparrows [*Passer domesticus*] and European starlings [*Sturnus vulgaris*]). Section 3503.5 specifically protects birds in the orders Falconiformes and Strigiformes (birds of-prey). Section 3513 essentially overlaps with the MBTA, prohibiting the "Take" or possession of any migratory non-game bird. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered "Take" by the CDFW.

4.2.7 Fully Protected Species and Species of Special Concern

The classification of "fully protected" was the CDFW's initial effort to identify and provide additional protection to those animals that were rare or faced with possible extinction. Lists were created for fishes, amphibians, reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under CESA and/or FESA. The CFGC sections (fish at Sec. 5515, amphibians and reptiles at Sec. 5050, birds at Sec. 3511, and mammals at Sec. 4700) dealing with "fully protected" species state that these species "…may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected species," (CDFW, 1998) although "Take" may be authorized for necessary scientific research. This language makes the "fully protected" designation the strongest and most restrictive regarding the "Take" of these species. In 2003, the code sections dealing with fully protected species were amended to allow the CDFW to authorize "Take" resulting from recovery activities for state-listed species.

SSCs are broadly defined as animals not listed under the CESA, but that are nonetheless of concern to the CDFW because they are declining at a rate that could result in listing or historically occurred in low numbers with known threats to their persistence currently existing. This designation is intended to result in special consideration for these animals by the CDFW, land managers, consulting biologists, and others, and is intended to focus attention on the species to help avert the need for costly listing under CESA and cumbersome recovery efforts that might ultimately be required. This designation also is intended to stimulate collection of additional information on the biology, distribution, and status of poorly known at-risk species, and focus research and management attention on them. Although the SSC designation provides no special legal status, they are given special consideration under CEQA during project review.

Table 1 in Appendix 2 includes potentially-occurring federal- and state-listed species and SSC animals that may occur in the project area.

4.2.8 Natural Community Conservation Planning Act

The Natural Community Conservation Planning (NCCP) Act of 1991 is an effort by the State of California and numerous private and public partners that is broader in its orientation and objectives than the CESA and FESA (refer to discussions above). The primary objective of the NCCP Act is to conserve natural communities at the ecosystem scale while accommodating compatible land uses (CDFW, 1991). The NCCP Act seeks to anticipate and prevent the controversies and gridlock caused by species listings by focusing on the long-term stability of wildlife and plant communities and including key interests in the process.

No regionally-occurring natural community or associated plan is listed by the state for the project area.

5.0 Special-status Biological Resources

An evaluation was conducted for the presence or absence of potential habitat for special-status plant and animal species. CNDDB RareFind (CDFW, 2022a), BIOS (CDFW, 2022b), and CNPS (CNPS, 2022a) searches were completed for the 7.5-minute USGS Lake Shastina quadrangle and all adjacent quadrangles. The databases were queried for historical and existing occurrences of listed species or species proposed for listing. In addition, a list of all federally-listed species that are known to occur or may occur in the vicinity was obtained from the USFWS' IPaC (USFWS, 2022a). The critical habitat mapper (USFWS, 2022b) was reviewed, however no critical habitat was mapped within or adjacent to the study area.

Table 1 in Appendix 2 includes all the animal species reported from the queries, their preferred habitat, and a notation whether there is suitable habitat present within the study area for the species. Table 2 in Appendix 2 includes all the plant species reported from the queries and the typical habitat where they occur. The potential for occurrence of those species included on the lists were then evaluated based on the habitat requirements of each species relative to the conditions observed during the field surveys. Each species was evaluated for its potential to occur in the study area according to the following criteria:

- None. Species listed having "none" are those species for which:
    - There is no suitable habitat present in the study area (that is, habitats in the study area suitable for the species requirements [for example, elevation, hydrology, disturbance regime, etc.]).
- Low. Species listed as having a "low" potential to occur in the study area are those species for which:
    - There is no known record of occurrence in the vicinity, and
    - There is marginal or very limited suitable habitat present within the study area
- Moderate. Species listed as having a "moderate" potential to occur in the study area are those species for which:
    - There are known records of occurrence in the vicinity, and
    - There is suitable habitat present in the study area
- High. Species listed have a "high" potential to occur in the study area are those species for which:
    - There are known records of occurrence in the vicinity (there are many records and/or records in proximity), and
    - There is high suitable habitat present in the study area
- Present. Species listed as "present" in the study area are those species for which:
    - The species was observed in the study area

5.1 Special-status Animal Species

Based on a review of special-status animal species, 43 special-status animal species have been reported with the potential to occur in the project region consisting of the Lake Shastina quadrangle and the

surrounding quadrangles. Of the special-status animal species potentially occurring in the region, 30 animal species are considered to have no or a low potential to occur at the project site and 13 species have a moderate to high potential. Species with a moderate or high potential for occurrence within the study area are described below.

5.1.1 Amphibians

No special-status amphibians have a moderate or high potential to occur within the study area.

5.1.2 Birds

The Cooper's Hawk (*Accipiter cooperii*) occupies woodlands, open and interrupted and marginal habitats. Nests are primarily in riparian areas with deciduous trees, in canyons bottoms, and among live pines and spruces. It is not listed under CESA or FESA, but is on the CDFW Watch List and has heritage ranking of G5/S4. Suitable habitat exists within the study area for this species, and it was detected. The project will not directly impact suitable habitat for this species. Noise disturbance from project activities has the potential to impact this species during the nesting season.

The golden eagle (*Aquila chrysaetos*) occupies cliff-walled canyons for nesting along with large trees in open areas and prefers rolling foothills, sage-juniper flats, and mountain areas. It is not listed under CESA or FESA, but is on the CDFW Watch List, listed as Sensitive and Fully Protected, is a USFWS Bird of Conservation Concern, and has heritage ranking of G5/S3. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

The great blue heron (*Ardea Herodias*) is found in wetlands, riparian forests, and marshes. They typically nest on north slopes near water in rookeries in large trees that are red fir, lodgepole pine, Jeffrey pine, or aspens. It is not listed under CESA or FESA, but is listed as Sensitive by CDFW and has a heritage ranking of G5/S4. Suitable habitat exists within the study area for this species, and it was detected. The project will not directly impact suitable habitat for this species.

The black tern (*Chlidonias niger*) prefers large freshwater wetlands, dense marshes, river edges, and lakes. They nest in areas of shallow and still water sheltered by cattails and bulrushes. It is not listed under either CESA or FESA, but has a heritage ranking of G4G5/S2. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

The prairie falcon (*Falco mexicanus*) occupies grassland and scrub in dry and open terrain. Nesting sites can be found on cliffs and it forages long distances for prey. It is not listed under either federal or California endangered species acts but is on the CDFW Watch List and has a heritage ranking of G5/S4. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

The bald eagle (*Haliaeetus leucocephalus*) can be found near rivers and lake margins. Most nests will be within a mile of water and will be in tall protruding conifer trees. It is Delisted from FESA, but is Endangered under CESA with special status by CDFW of Fully Protected and Sensitive and by USFWS as a Bird of Conservation Concern. The bald eagle has a heritage ranking of G5/S3. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

The California gull (*Larus californicus*) favors shorelines, lakes and marshes. They nest in large groups on islands within strongly alkaline lakes. It is not listed under CESA or FESA, but is on the CDFW Watch List and listed as a Bird of Conservation Concern by USFWS. The California gull has a heritage ranking of G5/S4. Suitable habitat exists within the study area for this species and it was detected. The project will not directly impact suitable habitat for this species.

The double-crested cormorant (*Nannopterum auritum*) is found near lakes and ponds with perching areas. It forms breeding colonies in fresh or strongly alkaline lakes. It is not listed under CESA or FESA, but is on the CDFW Watch List and has heritage ranking of G5/S4. Suitable habitat exists within the study area for this species, and it was detected. The project will not directly impact suitable habitat for this species.

The osprey (*Pandion haliaetus*) occupies any fish-filed water, including rivers, reservoirs, and lakes. They build nests on top of elevated telephone or power poles and treetops near bodies of water with large amounts of fish. It is not listed under CESA or FESA, but is considered Sensitive, is on the CDFW Watch List, and has heritage ranking of G5/S4. Suitable habitat exists within the study area for this species, and it was detected. The project will not directly impact suitable habitat for this species. Noise disturbance from project activities has the potential to impact this species during the nesting season.

The bank swallow (*Riparia riparia*) can be found in riparian scrub, riparian woodlands, and swamp edges. It requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, and lakes to dig nesting holes. It is not listed under FESA, but under CESA is listed as Threatened, listed as Sensitive by CDFW, and has heritage ranking of G5/S2. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

The yellow warbler (*Setophaga petechia*) favors open woodlands, swamp edges, and streams below 9,000 ft. Nests are built near streamside thickets in willows, hawthorns, dogwoods, and white cedars, 10-40 ft off the ground. It is not listed under CESA or FESA and has heritage ranking of G5/S3S4. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

5.1.3 Fishes

No special-status fishes have a moderate or high potential to occur within the study area.

5.1.4 Insects

No special-status insects have a moderate or high potential to occur within the study area.

5.1.5 Mammals

The North American porcupine (*Erethizon dorsatum*) occupies forested habitats in a wide variety of coniferous and mixed woodlands within the Sierra Nevada, Cascade, and Coast ranges. It is not listed under FESA and CESA and has heritage ranking of G5/S3. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

5.1.6 Reptiles

The western pond turtle (*Emys marmorata*) occupies ponds, marshes, rivers and stream below 6,000 ft elevation. They require upland habitat 0.5 kilometers (km) from water for egg-laying. It is not listed under CESA or FESA, but is listed as a SSC, Vulnerable, and Sensitive with a heritage ranking of G5/S3S4. Although this species was not detected, suitable habitat does exist within the study area. The project will not directly impact suitable habitat for this species.

5.2 Special-status Plant Species

Based on review for the special-status botanical species, 42 special-status botanical species have been reported from the region consisting of the Lake Shastina quadrangle and the surrounding quadrangles. Of the special-status botanical species reported for the region, 30 botanical species are considered to have low or no potential to occur within the study area. Twelve (12) species have a moderate to high potential of occurring within the study area. Species with a moderate or high potential of occurrence within the study area are described below.

Woolly balsamroot (*Balsamorhiza lanata*) is a perennial herb in the Asteraceae family. It is neither state nor federally listed but has a CRPR of 1B.2 and a heritage rank of G3/S3. Its elevation range is reported from 2,624–3,444 ft above sea level. Within its range in northern California, its blooming period is reported as April to June. This species is reported in cismontane woodland and is typically found in rocky and volcanic areas. There are 34 occurrences that have been observed and reported within the nine-quad search, with the most recent occurrence within the Weed quad in 2003. This recorded occurrence was less than a mile from the study area situated southwest of Jackson Ranch Road.

Greene's mariposa-lily (*Calochortus greenei*) is a perennial herb in the Liliaceae family. It is neither state nor federally listed but has a CRPR of 1B.2 and a heritage rank of G3/S2S3. Its elevation is reported from 3,395–6,200 ft above sea level. Within its range in northern California, its blooming period is reported as June to August. This species is reported in cismontane woodland and is typically found in rocky and volcanic areas. Within the nine-quad search, numerous Rarefind occurrences are reported, the nearest is approximately 8 miles northeast of the study area with an observation date in 2011.

Shasta chaenactis (*Chaenactis suffrutescens*) is a perennial herb in the Asteraceae family. It is neither state nor federally listed, but has a CRPR of 1B.3 and a heritage rank of G2G3/S2S3. Its elevation is reported from 2,460–9,185 ft. Within its range in California, its blooming period is May to September. This species is reported in lower montane coniferous forest and is typically found in sandy or serpentinite areas. There are 10 Rarefind occurrences within the nine-quad search. The most recent observation was reported in 2007, approximately 4.4 miles east of the study area.

Modoc green-gentian (*Frasera albicaulis var. modocensis*) is a perennial herb in the Gentianaceae family. It is neither state nor federally listed, but has a CRPR of 2B.3 and a heritage rank of G5T3T4/S2S3. Its elevation is reported from 2,995–5,740 ft. Within its range in California, its blooming period is May to July. The species is reported in great basin grassland within openings. There are 2 Rarefind occurrences within the nine-quad search, with the most recent finding reported in 1940.

Alkali hymenoxys (*Hymenoxys lemmonii*) is a perennial herb in the Asteraceae family. It is neither state nor federally listed, but has a CRPR of 2B.2 and a heritage rank of G4/S2S3. Its elevation is reported rom 785–11,125 ft. Within its range in California, its blooming period is May to September. This species is

reported in Great Basin scrub and lower montane coniferous forest. There are 8 Rarefind occurrences within the nine-quad search with the closest being approximately 7.3 miles southwest of the study area reported in 1997.

Baker's globe mallow (*Iliamna bakeri*) is a perennial herb in the Malvaceae family. It is neither state nor federally listed, but has a CRPR of 4.2 and a heritage rank of G4/S3. Its elevation is reported from 3,280–8,205 ft. Within its range in California, its blooming period is June to September. This species is reported in chaparral, great basin scrub, lower montane coniferous forest, and pinyon and juniper woodland areas that are volcanic. Within the nine-quad search, 1 occurrence from 1969 was reported 3.7 miles east of the study area.

Peck's lomatium (*Lomatium peckianum*) is a perennial herb in the Apiaceae family. It is neither state nor federally listed, but has CRPR of 2B.2 and a heritage rank of G4/S1. Its elevation is reported from 2,295–5,905 ft above sea level. Within its range in California, its blooming period is April to June. This species is reported in chaparral, cismontane woodland, lower montane coniferous forest, and pinyon and juniper woodland with volcanic soil. There are 3 Rarefind occurrences within the nine-quad search, the most recent finding reported in 2012, 3.72 miles southwest of the study area.

Brittle prickly-pear (*Opuntia fragilis*) is a perennial stem in the Cactaceae family. It is neither state nor federally listed, but has a CRPR of 2B.1 and a heritage rank of G5/S1. Its elevation is reported from 2,690–2,885 ft above sea level. Within its range in California, its blooming period is April to July. This species is reported in pinyon and juniper woodland within volcanic areas. There are 2 Rarefind occurrences within the nine-quad search, the closest being approximately 5 miles northwest of the study area in 2005.

Shasta orthocarpus (*Orthocarpus pachystachyus*) is an annual herb in the Orobanchaceae family. It is neither state nor federally listed, but has a CRPR of 1B.1 and a heritage rank of G1/S1. Its elevation is reported from 2,755–2,790 ft above sea level. Within its range, the blooming period is in May. This species is reported in great basin scrub, meadows, seeps, valley and foothill grasslands. There are 2 Rarefind occurrences within the nine-quad search, with the most recent and closest reported 6 miles southwest of the study area in 1998.

Cooke's phacelia (*Phacelia cookei*) is an annual herb in the Hydrophyllaceae family. It is neither state nor federally listed, but has a CRPR of 1B.1 and a heritage rank of G1/S1. Its elevation is reported from 3,595–5,580 ft above sea level. Within its range, its blooming period is June to July. This species is reported in Great Basin scrub and lower montane coniferous forest with sandy and volcanic soils. There are 2 Rarefind occurrences nine-quad search, with the closest being 2 miles east of the study area in 1985.

Hairy Marsh hedge-nettle (*Stachys Pilosa*) is a perennial rhizomatous herb in the Lamiaceae family. It is neither state nor federally listed, but has a CRPR of 2B.3 and a heritage rank of G5/S3. Its elevation is reported from 3,935–5,805 ft above sea level. Within its range, its blooming period is June to August. This species is reported in great basin scrub, meadows, and seeps. There is 1 Rarefind occurrence within the nine-quad search that is approximately 3.70 miles northwest of the study area in 2010.

Henderson's triteleia (*Triteleia hendersonii*) is a perennial herb in the Themidaceae family. It is neither state nor federally listed, but has a CRPR of 2B.2 and a heritage rank of G4/S1. Its elevation is reported

from 2,495–3,935 ft above sea level. Within its range, its blooming period is May to July. This species is reported in cismontane woodland. There is 1 Rarefind occurrence within the nine-quad search, 4.70 miles southwest of the study area in 1956.

5.3 Special-status Habitats and Natural Communities

5.3.1 Designated Critical Habitat

The IPaC query resulted in no critical habitats within the project area. The nearest Designated Critical Habitat to the study area is approximately six miles away to the southwest, mapped for Northern Spotted Owl (*Strix occidentalis caurina;* USFWS, 2020).

5.3.2 Vegetation Alliances

Sensitive vegetation communities as defined by the Manual of California Vegetation or CDFW Natural Communities list occurs within the study area (CNPS, 2022b; CDFW, 2022d) with a State rank of S3 or lower, require CEQA analysis if potential impacts may occur due to the proposed project. Sensitive vegetation communities were not surveyed and mapped during the site visit in 2022 and would be part of a pre-construction protocol botanical survey.

5.3.3 Wetland and Riparian Habitats

Streams and seasonal drainage features that flow into waters of the U.S. or State will likely fall under the jurisdiction of the U.S. CWA, California Porter-Cologne Water Quality Control Act, and CFGC 1600. Any potential impacts to aquatic features will be protected by existing regulations. Additional best management practices (BMPs) are included in Section 7.0 Recommendations.

Project components as they relate to distance to water features:

- Lost Lake's (northwest of Lake Shastina) three closest utility upgrades are to fire hydrant #292 at 533 ft to the nearest water feature, fire hydrant #294 at 570 ft to the nearest water feature, and fire hydrant #295 at 590 ft to the nearest water feature.
- Lake Shastina's three closest upgrades are to fire hydrant #293 at 300 ft to the nearest water feature; fire hydrant #286 at 335 ft to the nearest water feature; fire hydrant #294 at 360 ft to the nearest water feature.
- Shasta River's five closest utility upgrades are fire hydrant #277 at 172 ft to the nearest water feature, fire hydrant #266 at 205 ft to the nearest water feature, fire hydrant #265 at 235 ft to the nearest water feature, fire hydrant #267 at 264 ft to the nearest water feature, and fire hydrant #268 at 275 ft to the nearest water feature (See Figure 4).

A formal wetland delineation was not conducted as a part of this study.

5.3.4 Nesting Bird Habitat

All locations with vegetative cover, shrub layer, or tree canopy within the study area may provide suitable habitat for a diverse assemblage of birds, including special-status species. Ground disturbance and vegetation removal proposed as part of the project activities are minimal and localized to the immediate vicinities of existing development.

5.3.5 Wildlife Movement Corridors

The northern half of the project site is within the far western edge of the Siskiyou Mule deer (*Odocoileus hemionus*) winter range migration corridor and migration stopovers. Mule deer migrate for winter during mid-November to mid-January which begins in the Dorris, CA area and ends near Day, CA (CNRA, 2022b). Spring migration for mule deer occurs April-May depending on snow levels (CNRA, 2022a). Lake Shastina is also a stopover for migrating birds as it is a large body of water along the pacific flyaway. Migration for waterfowl and songbirds begin in the spring (March-May) with them flying north and then in the fall (September-November) when they fly south.

The project site is approximately 5 miles southwest of the documented 2016-2020 elk migration area in East Shasta Valley. Elk will spend their time during the winter months (December-February) on private ranches in the Shasta Valley and then in the spring (March-May) they will move south and east to the Grass Lake area (Karuk Tribe, 2007). Their summer range includes Grass Lake, Bull Meadows, and Deer Mountain. The elk herd in this area is called the Shasta Valley Herd and is a mix of Rocky Mountain (*Cervus canadensis nelsoni*) and Roosevelt Elk (*Cervus canadensis roosevelti*; Wittmer, et al., 2021).
Water courses and their associated riparian zones, due to complex structure providing cover, are likely the primary movement corridors for smaller mammals within the study area. Additionally, wildlife may use roads and trails that provide openings in areas of dense vegetation.

6.0 Conclusions

The purpose of this report iss to assess the biological resources and habitat available within the study area, and to evaluate project-related impacts. The habitat value and availability were assessed for special-status species that could occur within the study area. See Section 7.0 for recommendations for avoiding and mitigating impacts.

6.1 Special-status Animal Species

Four special-status animal species were observed within the project area during the survey. These species are the double-crested cormorant, California gull, osprey, and Cooper's hawk. An additional nine species have a moderate or high potential to occur within the project area based on habitat suitability.

- The double-crested cormorant has low potential of nesting in the project area as the habitat is not conducive of hosting a colony of cormorants due to the existing residential and recreational human activity in the area.
- The California gull is unlikely to nest in the project area due to high disturbance and lack of suitable nesting habitat.
- The osprey has a moderate potential of nesting along the river or in trees near the lake of the Lake Shastina community. To mitigate disturbance, see recommendations in Section 7.0.
- The Cooper's hawk may have a moderate potential of nesting in the project area as ponderosa pines are present and this is a known tree used by this species. To mitigate disturbance, see recommendations in Section 7.0.

Impacts to special-status species can be reduced to less-than-significant levels by incorporating the recommendations within Section 7.0 of this report.

6.2 Nesting Birds

All locations with a shrub or tree canopy layer especially near a river within the study area may provide suitable nesting for a diverse assemblage of migratory birds. Although direct impacts to nesting birds and their habitat are not expected, noise disturbance may cause an impact during the nesting season. Impacts to nesting birds can be reduced to less-than-significant levels by incorporating the recommendations within Section 7.0 of this report.

6.3 Impacts on Wildlife Movement

Wildlife movement corridors within the study area are expected to be concentrated along shrubby and vegetated areas directed towards Lake Shastina. These vegetated areas are highly disturbed areas from existing residential development. Construction noise and traffic are not likely to impact wildlife movement in these areas. The construction is primarily to upgrade already present utilities, therefore very little habitat will be affected.

7.0 Recommendations

SHN recommends that the following measures be implemented within the project area to reduce impacts to less-than-significant levels for special-status biological resources:

- Conduct seasonally appropriate floristic surveys in accordance with CDFW protocol (CDFW, 2018) prior to ground disturbance.
- If construction activities begin during the bird nesting season (generally February 1 to August 15), a qualified biologist should conduct nest surveys no more than seven days prior to activities, within the construction limits and within 100 ft (200 ft for raptors) of the construction limits.
- Prior to ground disturbance near aquatic features, utilize standard erosion and sediment control BMPs, such as straw wattles, to avoid sediment discharge.

8.0 References

California Department of Fish and Wildlife. (1984). "California Endangered Species Act. Fish and Game Code sections 2070 and 2080." Sacramento, CA:CDFW.

---. (1991). Natural Community Conservation Planning Act [2800 - 2835] Sacramento, CA:CDFW.

---. (1994). A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1616, California Fish and Game Code. Sacramento, CA:CDFW.

---. (1998). Fish and Game Code. Sacramento, CA:CDFW.

---. (2018). Protocols for Surveying and Evaluating Impacts to Special-status Native Plant Populations and Natural Communities. Sacramento, CA:CDFW.

---. (2022a). California Natural Diversity Database (CNDDB). Accessed September 2022 at: http://www.dfg.ca.gov/biogeodata/cnddb/.

---. (2022b). Biogeographic Information and Observation System (BIOS), Version 5.96.99c. Sacramento, CA:CDFW. Accessed September 2022 at: https://apps.wildlife.ca.gov/bios.

---. (2022c). California Special Animals List. Accessed October 2022 at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline.

---. (2022d). Vegetation Classification and Mapping Program (VegCAMP), Natural Communities List. Sacramento, CA:CDFW. Accessed May 2022 at: http://www.dfg.ca.gov/biogeodata/vegcamp/natural_communities.asp.

---. (2022e). Interim Instream Flow Criteria for the Protection of Fishery Resources in the Scott River Watershed, Siskiyou County, February 2017. Accessed July 2022 at: https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/Scott-Shasta-Study.

California Native Plant Society, Rare Plant Program. (2022a). Inventory of Rare and Endangered Plants of California (online edition, v9-01 0.0). Accessed May 2022 at: http://www.rareplants.cnps.org.

---. (2022b). A Manual of California Vegetation, Second Edition. Sacramento, CA:CNPS Press.

Christiansen, R.L., Calvert, A.T., and Grove T.L. (2017). Geologic field-trip guide to Mount Shasta volcano, northern California: U.S. Geological Survey Scientific Investigations Report 2017-5022-K3, 33 p. Accessed July 2022 at: https://pubs.usgs.gov/sir/2017/5022/k3/sir20175022_k3.pdf.

California Natural Resources Agency (CNRA). (1970). *California Environmental Quality Act.* CCR: Title 14, Div. 6, Chap. 3, Appendix G; Sections 15125 (c) and 15380(d).

---. (1987). *Definition of a Stream.* CCR: Title 14, Div. 1, Subdivision 1, Chap. 1, Section 1.72.

---. (2022a). Accessed August 2022 at: https://gis.data.cnra.ca.gov/datasets/CDFW::elk-migration-corridors-east-shasta-valley-1999-2001-2016-2020-ds2903/explore?location=41.729333%2C-122.200168%2C10.81.

---. (2022b). Mule Deer Migration Corridors – Siskiyou – 2015-2020, Accessed August 2022 at: https://data.cnra.ca.gov/dataset/mule-deer-migration-corridors-siskiyou-2015-2020-ds2976.

Environmental Laboratory. (1987). C*orps of Engineers Wetland Delineation Manual. Technical Report Y-87-1*. Vicksburg, MS:USACE Waterways Experiment Station.

Karuk Tribe, Elk Management Strategy-Klamath National Forest. (May 2007). Accessed August 2022 at: https://sipnuuk.karuk.us/system/files/atoms/file/KarukTribe_Library_B022_016.pdf.

Hirt, W. (1995). Introduction to the Geology of the Mount Shasta Region: Southern Siskiyou Newspaper, July 19, 1995. Accessed July 2022 at: https://www.siskiyous.edu/library/shasta/documents/introgeo.pdf.

McLaughlin, J., and F. Harradine. (1965). Soils of western Humboldt County. 84 p. Department of Soils and Plant Nutrition, University of California, Davis.

National Oceanic and Atmospheric Administration (NOAA). (2022). National Weather Service. Accessed July 2022 at: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca.

Normandeau Associates, Inc. (2022). Shasta River Cumulative Hydrology for PRC. Accessed July 2022 at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=158173.

State Water Resource Control Board. (1969.) *Porter-Cologne Water Quality Control Act*. CWC Section 7. Sacramento, CA.

U.S. Army Corps of Engineers/Environmental Protection Agency. (1973). *Endangered Species Act. 16 USC 1531, 1532, 16 US.C 1536, 50 CFR 17.3, Section 7.* Washington, D.C.

---. (2008). Clean Water Act Jurisdiction. Washington, D.C.:USACE/EPA.

U.S. Environmental Protection Agency (EPA). (1977). *Section 401 of the Clean Water Act, 33 USC § 1341.* Washington, D.C.

U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS). (2022). Web Soil Survey. Accessed May 2022 at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

U.S. Fish and Wildlife Service. (USFWS). (1918). Migratory Bird Treaty Act. 50 CFR 21, 16 USC 703. Washington, D.C.

---. (1934). *The Fish and Wildlife Coordination Act (16 USC Sections 661-667e, March 10, 1994, as amended 1946, 1958, 1978, and 1995)*. Washington, D.C.

---. (2020). Revised Transmittal of Guidance: Estimating the Effects of Auditory and Visual Disturbance to Northern Spotted Owls and Marbled Murrelets in Northwestern California. Accessed at: https://citizensofebeysreserve.com/wp-content/uploads/2022/06/MaMu-Noise-Thresholds-USFWS.pdf.

---. (2022a). "IPaC Trust Resources Report". Accessed September 2022 at: https://ecos.fws.gov/ipac/.

---. (2022b). Critical Habitat Mapper. Accessed December 2022 at: https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.

---. (2022c). National Wetlands Inventory. Accessed August 2022 at: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

Wittmer, H.U., Cristescu, B., Spitz, D.B., Nisi, A. & Wilmers, C.C. (2021). Final report Siskiyou deer-mountain lion study (2015-2020). Report to the California Department of Fish and Wildlife. 71pp. Accessed August 2022 at: https://cpb-us-e1.wpmucdn.com/sites.ucsc.edu/dist/0/1412/files/2021/05/Siskiyou-Deer-final-report_2Mar2021.pdf.

1

Photographs

Photo 1: Looking west at pump station 53 on Palmer Drive where the location of the temporary water tank outside of the building would be placed as water tank 4 is upgraded to a bigger size. Water tank #4 can be seen on top of the slope. Gravel is observed on the east side of the pump station where the temporary water tank would be placed. Photo taken: 6/22/2022.

Photo 2: Looking east on Elk Trail Road and Hogan Drive by fire hydrant #191. Small sized rabbit brush, small rocks and cheat grass is observed as vegetation that would be disturbed. The ponderosa pines in the picture were observed for nests and zero were found. Photo taken: 6/22/2022.

Photo 3: Looking north west from Stone Crest Drive at water tank #3 which is surrounded by small rocks, gravel, and juniper trees. Water tank #3 will be re-painted. Photo taken: 6/22/2022.

Photo 4: Looking south from the service road to water tank #4 that will be replaced with a larger water tank. Water tank #4 is surrounded by manzanita shrub, gravelly soil, and juniper.

Photo 5: Looking west from the end of Lake Shore Drive where test well #12 would be drilled. Rabbit brush, small rocks, small mounds, and juniper trees can be observed and would be disturbed in the process. No burrows were observed in the mounds and no nests were observed in the trees. Photo taken: 6/22/2022.

Photo 6: Looking North east from the cul-de-sac of Stone Crest Drive at fire hydrant #289 that will be replaced with a new fire hydrant. This fire hydrant is surrounded by asphalt, small rocks, gravelly soil, and juniper trees. The soil directly around the fire hydrant will be disturbed as all parts of the hydrant will be replaced down to the elbow in the ground.

Photo 7: Looking east from Mountain Wood Drive onto fire hydrant #275 that will be replaced with a new fire hydrant. This fire hydrant is surrounded by asphalt, large rocks, gravelly soil, and juniper trees. The soil directly around the fire hydrant will be disturbed as all parts of the hydrant will be replaced down to the elbow in the ground.

Photo 8: Looking east from Jack Rabbit Road onto fire hydrant #175 that will be replaced with a new fire hydrant. This fire hydrant is surrounded by small rabbit brush, gravelly soil, and ponderosa pine. The soil directly around the fire hydrant will be disturbed as all parts of the hydrant will be replaced down to the elbow in the ground.

Photo 9: Looking south west from Indian Island onto fire hydrant #79 that will be replaced with a new fire hydrant. This fire hydrant is surrounded by small rabbit brush, gravelly soil, ponderosa pine, and juniper. The soil directly around the fire hydrant will be disturbed as all parts of the hydrant will be replaced down to the elbow in the ground.

Photo 10: Looking East from Elk Trail Road. Abandoned Pump Station #52 (Figure 3) that is proposed to be a new pump station. The concrete slap that is still present is surrounded by rabbitbrush and manzanita shrub. The soil directly around the concrete will be disturbed when building the pump house. Fire hydrant #190 is the closest to this proposed area (Figure 4).

Special-status Species Scoping Lists

2

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Amphibians									
Rana boylii	foothill yellow-legged frog	None	Endangered (excluding the North Coast Clade population which covers the project area)	SSC, S	G3	S3	Partly-shaded, shallow streams and riffles with a rocky substrate in Aquatic, Chaparral, Cismontane woodland, Coastal scrub, Klamath/North coast flowing waters, Lower montane coniferous forest, Meadow & seep, Riparian forest, Riparian woodland Sacramento/San Joaquin flowing waters.	Needs at least some cobble-sized substrate for egg-laying. Needs at least 15 weeks to attain metamorphosis.	Low.
Rana cascadae	Cascades frog	None	Candidate Endangered		G3G4	S3	Montane aquatic habitats such as mountain lakes, small streams, and ponds in meadows; open coniferous forests.	Standing water required for reproduction. Hibernates in mud on the bottom of lakes and ponds during the winter.	Low.
Birds									
Accipiter cooperii	Cooper's hawk	None	None	WL	G5	S4	Forest and woodland, urban and suburban areas, open fields	Build nests in pines, oaks, Douglas-firs, beeches, and spruces	Present.
Accipiter gentiles	northern goshawk	None	None	S, SSC	G5	S3	North coast coniferous forest, Subalpine coniferous forest, Upper montane coniferous forest.	Usually nests on north slopes, near water. Red fir, lodgepole pine, Jeffrey pine, and aspens are typical nest trees.	Low.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Antigone canadensis tabida	greater sandhill crane	None	Threatened	S, FP	G5T5	S2	Marsh & swamp, Meadow & seep, Wetland.	Prefers grain fields within 4 miles of a shallow body of water used as a communal roost site; irrigated pasture used as loafing sites.	Low.
Aquila chrysaetos	golden eagle	None	None	S, FP, WL	G5	S3	Rolling foothills, mountain areas, sage-juniper flats, and desert.	Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	Moderate.
Ardea herodias	great blue heron	None	None	S	G5	S4	Brackish marsh, Estuary, Freshwater marsh, Marsh & swamp, Riparian forest, Wetland.	Rookery sites in close proximity to foraging areas: marshes, lake margins, tide-flats, rivers and streams, wet meadows.	Moderate.
Chlidonias niger	black tern	None	None		G4G5	S2	Large freshwater wetlands, dense marshes on the edges of shallow lakes of the open prairies or northern forests, sewage lagoons, river edges, lakes, marshes, beaches, and over open ocean waters, far out to sea.	Nest in areas of shallow, still water sheltered from wind and waves with cattails, bulrushes or other emergent vegetation, some nests are set on muskrat feeding platforms or lodges.	Moderate.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Threatened	Endangered	S, RWL	G5T2T3	S1	Riparian forest, nest along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	Low.
Contopus cooperi	olive-sided flycatcher	None	None		G4	S3	Open woodlands, pine forests, rivers, streams and partially logged areas, recent burns, beaver ponds, bogs, and muskegs.	Nest in areas of that have openings or edges in the forest.	None.
Empidonax traillii	willow flycatcher	None	Endangered	S	G5	S1S2	Inhabits extensive thickets of low, dense willows on edge of wet meadows, ponds, Riparian woodlands Riparian scrubs, or backwaters; 2000-8000 ft elevation.	Requires dense willow thickets for nesting/roosting. Low, exposed branches are used for singing posts/hunting perches.	Low.
Falco mexicanus	prairie falcon	None	None	WL	G5	S4	grassland and scrub, dry, open terrain, either level or hilly.	Breeding sites located on cliffs. Forages far afield, even to marshlands and ocean shores.	Moderate.
Haliaeetus leucocephalus	bald eagle	Delisted	Endangered	FP, S, BCC	G5	S3	Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within 1 mile of water.	Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	Moderate.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Icteria virens	yellow-breasted chat	None	None	SSC	G5	S3	Dense shrubbery, abandoned farm fields, clearcuts, powerline corridors, fencerows, forest edges and openings, swamps, edges of streams and ponds, blackberry bushes.	Nest in low, dense vegetation such as raspberry, blackberry, grapevine, dogwood, hawthorn, cedar, honey suckle, and sumac.	None.
Larus californicus	California gull	None	None	WL, BCC	G5	S4	Littoral waters, sandy beaches, waters and shorelines of bays, tidal mud-flats, marshes, lakes, etc.	Colonial nester on islets in large interior lakes, either fresh or strongly alkaline.	Present.
Nannopterum auritum	double-crested cormorant	None	None	WL	G5	S4	Lakes and ponds with perching areas.	Roosts and form breeding colonies on smaller lagoons or ponds in/near clusters of trees.	Present.
Pandion haliaetus	osprey	None	None	S, WL	G5	S4	Any expanse of shallow, fish-filled water, including rivers, lakes, reservoirs, lagoons, swamps, and marshes.	Nesting habitat must include an adequate supply of accessible fish within a max. of 12 miles to nest; open, elevated nest at the top of trees, phone, or power poles.	Present.
Riparia riparia	bank swallow	None	Threatened	S	G5	S2	Riparian scrub, Riparian woodland, Colonial nester; nests primarily in riparian and other lowland habitats west of the desert.	Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Moderate.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Setophaga petechia	yellow warbler	None	None		G5	S3S4	Open woodland, bushes, swamp edges, streams below 9,000 ft elevation.	Breeds in streamside thickets and create nests in willow, hawthorn, raspberry, white cedar, dogwood, and honeysuckle, 10-40 ft off ground	Moderate.
Strix nebulosa	great gray owl	None	Endangered		G5	S1	Pine and fir forest adjacent to montane meadows between 2500-7500 feet elevation. In winter they move downslope into oak woodlands and lower elevation mixed deciduous and evergreen forests.	Nest site near an opening in the forest such as a meadow, bog, or field. Use old raptor or raven nests.	Low.
Strix occidentalis caurina	Northern Spotted Owl	Threatened	Threatened	None	G3G4T3	S2	old-growth forests, Douglas fir that are 150-200 years old, high canopy layers, snags and open spaces for flying underneath.	Old hollow trees for nesting sites.	None.
Crustaceans									
Pacifastacus leniusculus klamathensis	Klamath crayfish	None	None		G5T5	S3	Klamath River in Northern Cali and Southern Oregon.	Copulate, molt and lay eggs in brackish water.	None.
Fish									
Cottus klamathensis polyporus	Lower Klamath marbled sculpin	None	None		G4T2T4	S2S4	Aquatic; Prefer water temps of 10-15C, coarse substrates where water velocities ranged from slow	Eggs are deposited in clusters in nests under flat rocks.	Low.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
							to swift, in streams with widths greater than 20 m.		
Oncorhynchus kisutch pop. 2	coho salmon - southern Oregon / northern California ESU	Threatened	Threatened		G5T2Q	S2	Inhibit small coastal streams, large rivers such as the Klamath River system.	Use coastal streams typically associated with low gradient reaches of tributary streams for spawning.	None.
Oncorhynchus mykiss irideus pop. 1	steelhead - Klamath Mountains Province DPS	None	None		G5T3Q	S2	hatch in gravel-bottomed, fast-flowing, well-oxygenated rivers and streams, then migrate to the ocean. They will return to fresh water to spawn.	Prefer water temps from 46-52F.	None.
Insects									
Atractelmis wawona	Wawona riffle beetle	None	None		G3	S1S2	Aquatic; found in riffles of rapid, small to medium clear mountain streams; 2000-5000 ft elev.	Strong preference for inhabiting submerged aquatic mosses.	Low.
Bombus caliginosus	obscure bumble bee	None	None	VU	G2G3	S1S2	relatively humid and often foggy areas, Coastal areas from Santa Barbara County to north to Washington state.	Food plant genera include *Baccharis, Cirsium, Lupinus, Lotus, Grindelia* and *Phacelia.*	Low.
Bombus occidentalis	western bumble bee	None	None	S	G2G3	S1	Prefer elevations lower than 3000 m, open grassy areas, prairie, urban parks and gardens, sagebrush steppe, mountain meadows to alpine tundra.	Food plant genera include *Acontium, Allium, Arnica, Astragalus, Balsamorhiza, Brassica, Calypso, Castilleja,*	None.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
								Ceanothus, Centaurea, Chionophila, Chrysothamnus.	
Mammals									
Aplodontia rufa californica	Sierra Nevada mountain beaver	None	None		G5T3T4	S2S3	Riparian forest, Riparian scrub, Riparian woodland.	Needs dense understory for food and cover. Burrows into soft soil. Needs abundant supply of water.	Low.
Canis lupus	gray wolf	Endangered	Endangered		G5	S1	Minimal disturbance from humans in areas of 100 sq. mi. with road densities less than 1 mi. of linear road sq. mi., Douglas-fir, ponderosa pine and western larch forests.	Dens are typically situated in underground burrows, rock crevices, ledges, hollow logs, overturned stumps, and debris piles.	None.
Corynorhinus townsendii	Townsend's big-eared bat	None	None	SSC, S	G4	S2	Chaparral, Chenopod scrub, Great Basin grassland & scrub, Joshua tree woodland, Broadleaved upland & Lower & Upper montane coniferous forest, Meadow & seep, Mojavean desert scrub, Riparian forest & woodland, Sonoran desert scrub & thorn woodland, Valley & foothill grassland.	Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	Low.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Erethizon dorsatum	North American porcupine	None	None	None	G5	S3	Forested habitats in the Sierra Nevada, Cascade, and Coast ranges, with scattered observations from forested areas in the Transverse Ranges.	Wide variety of coniferous and mixed woodland habitat.	High.
Gulo gulo	wolverine	None	Threatened		G4	S1	Alpine, Alpine dwarf scrub, Meadow & seep, Montane dwarf scrub, North coast coniferous forest, Riparian forest, Subalpine coniferous forest, Upper montane coniferous forest, Wetland, high elevation	Needs water source. Uses caves, logs, burrows for cover and den area. Hunts in more open areas. Can travel long distances.	Low.
Lasionycteris noctivagans	silver-haired bat	None	None		G3G4	S3S4	Primarily a coastal and montane forest dweller, feeding over streams, ponds and open brushy areas.	Roosts in hollow trees, beneath exfoliating bark, abandoned woodpecker holes, and rarely under rocks. Needs drinking water.	Low.
Martes caurina	Pacific marten	None	None		G4G5	S3	Coniferous forest types including redwood, sierran mixed conifer, lodgepole pine, white fir, California red fir, Douglas-fir, ponderosa pine, Jeffrey pine, western white pine, whitebark pine and mountain hemlock.	Nest in dens located in branches, cavities or broken tops of live trees, snags, stumps, logs, woody debris piles, witch's brooms, and rock piles.	Low.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
Myotis evotis	long-eared myotis	None	None	S	G5	S3	Found in all brush, woodland and forest habitats from sea level to about 9000 ft. Prefers coniferous woodlands and forests.	Nursery colonies in buildings, crevices, spaces under bark, and snags. Caves used primarily as night roosts.	Low.
Ochotona princeps schisticeps	gray-headed pika	None	None		G5T4	S2S4	Talus and scree slope, Mountainous areas, generally at higher elevations, often above the treeline up to the limit of vegetation. At lower elevations found in rocky areas within forests or near lakes.	Talus slopes, occasionally on mine tailings. Prefers talus-meadow interface.	Low.
Ovis canadensis nelsoni	desert bighorn sheep	None	None		G4T4	S3	Alpine meadows, grassy mountain slopes and foothill country in proximity to rugged, rocky cliffs and bluffs.	Required drier slopes where annual snowfall is less than 60 inches a year.	None.
Taxidea taxus	American badger	None	None		G5	S3	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	Low.
Vulpes vulpes necator pop. 1	Sierra Nevada red fox - southern Cascades DPS	None	Threatened		G5TNR	S1	Use multiple habitat types in the alpine and subalpine zones including high-elevation conifer dominated by whitebark pine and mountain	May descend in winter to below subalpine zone consisting of red and white fir; as low as 1,400 meters (4,600 feet).	None.

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
							hemlock, as well as meadows and fell-fields.		
Mollusks									
Vespericola sierranus	Siskiyou hesperian	None	None		G3	S1S2	Found under logs in a swampy meadow in Siskiyou County (Roth, 1972).		Low.
Gonidea angulata	western ridged mussel	None	None		G3	S1S2	Aquatic; Primarily creeks and rivers and less often lakes. Originally in most of state, now extirpated from Central and Southern California.		Low.
Reptile									
Emys marmorata	western pond turtle	None	None	SSC, VU, S	G3G4	S3	Ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.	Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Moderate.

1. Species indicator status as assigned by Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and California Department of Fish and Wildlife (CDFW)

C: candidate
CT: candidate threatened
D: delisted
DPS: distinct population segment
FP: fully protected
NT: near threatened
PT: proposed threatened
SSC: species of special concern

Appendix 2 Table 1

Regionally occurring Special-status Animal Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Fed List	Cal List	Other Status	Global Rank	State Rank	General Habitat	Specific Habitat	Potential to Occur
E: endangered			T: threatened						
ESU: evolutionarily significant unit			WL: watch list						
2. Species Heritage rank as assigned by California Department of Fish and Wildlife (CDFW)									
G1/S1: critically imperiled			G4/S4: apparently secure						
G2/S2: imperiled			G5/S5: secure						
G3/S3: vulnerable									

Appendix 2 Table 2 Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC LSCSD Project, May 20, 2022 Lake Shastina and Surrounding 7.5' Quadrangles											
Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
Alisma gramineum	grass alisma	Alimataceae	None	None	G5	S3	2B.2	June-Aug	Marsh & Swamp, Wetland	Freshwater marsh	Low
Arnica viscosa	Mt. Shasta arnica	Asteraceae	None	None	G4	S3	4.3	Aug-Sept	Subalpine coniferous forest, Upper montane coniferous forest	Rocky	None
Balsamorhiza lanata	woolly balsamroot	Asteraceae	None	None	G3	S3	1B.2	Apr-Jun	Cismontane woodland	Rocky, Volcanic	Moderate
Botrychium pumicola	pumice moonwort	Ophioglossales	None	None	G3	S1	2B.2	Jul-Aug	Alpine boulder and rock field, subalpine coniferous forest	Loose pumice gravel, at high elevations of 2750 m	Low
Calochortus greenei	Greene's mariposa-lily	Liliaceae	None	None	G3	S2S3	1B.2	Jun-Aug	Meadows and seeps, cismontane woodland, pinyon and juniper woodland, upper montane coniferous forest	On volcanic outcrops and open, dry, gravelly soils. 1035-1890 m	Moderate
Campanula wilkinsiana	Wilkin's harebell	Campanulaceae	None	None	G2	S2	1B.2	Jul-Sep	Meadows and seeps, upper montane coniferous forest, subalpine coniferous forest.	Often on streambanks in meadows. 1265-2590 m.	None
Cardamine bellidifolia var. pachyphylla	fleshy toothwort	Brassicaceae	None	None	G5T4	S3	4.3	Jun-Aug	Alpine boulder and rock field, subalpine coniferous forest, upper montane coniferous forest.	rocky, scree, talus	None
Carex atherodes	wheat sedge	Cyperaceae	None	None	G5	S3	2B.2	Jun-Jul	Meadows and seeps, marshes and swamps, pinyon and juniper woodland.	1300-1540 m.	Low

Appendix 2 Table 2 Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC LSCSD Project, May 20, 2022 Lake Shastina and Surrounding 7.5' Quadrangles											
Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
Chaenactis suffrutescens	Shasta chaenactis	Asteraceae	None	None	G2G3	S2S3	1B.3	May-Sep	Lower & upper montane coniferous forest.	Sandy or serpentine soils. 730-2255 m.	High
Claytonia obovata	Rydberg's spring beauty	Portulacaceae	None	None	G4	S1	4.3	May-Jul	Subalpine coniferous forest	Openings, rocky, talus	None
Cordylanthus tenuis ssp. Pallescens	pallid bird's-beak	Orobanchaceae	None	None	G4G5T1	S1	1B.2	Jun-Sep	Lower montane coniferous forest.	Gravelly openings in brush patches next to coniferous forest; on volcanic alluvium. 1070-1615 m.	Low
Cypripedium californicum	California lady's-slipper	Orchidaceae	None	None	G4	S4	4.2	April-August	Streambanks, moist slopes, fens	30-2750 m elevation	Low
Cypripedium fasciculatum	clustered lady's-slipper	Orchidaceae	None	None	G4	S4	4.2	Apr-Jul	Mixed evergreen woods through mid-elevations		None
Cypripedium montanum	mountain lady's-slipper	Orchidaceae	None	None	G4	S4	4.2	Mar-Jun	Moist areas, dry slopes, mixed-evergreen or conifer forest	200-2200 m	None
Draba carnosula	Mt. Eddy draba	Brassicaceae	None	None	G2	S2	1B.3	Jul-Aug	Subalpine coniferous forest, Upper montane coniferous forest	Rocky, Serpentinite	None
Erigeron nivalis	snow fleabane daisy	Asteraceae	None	None	G5	S3	2B.3	Jul-Aug	Alpine boulder and rock field, meadows and seeps, subalpine coniferous forest.	On volcanic rock outcrops in cracks and crevices. 1780-2895 m.	None
Eriogonum pyrolifolium var. pyrolifolium	pyrola-leaved buckwheat	Polygonaceae	None	None	G4T4	S3	2B.3	Jul-Sep	Alpine boulder and rock field.	Sandy or gravelly sites; on pumice. 1885-3170 m.	None

Appendix 2 Table 2 Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC LSCSD Project, May 20, 2022 Lake Shastina and Surrounding 7.5' Quadrangles											
Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
Eriogonum umbellatum var. humistratum	Mt. Eddy buckwheat	Polygonaceae	None	None	G5T4	S4	4.3	May-Oct	Gravelly serpentine slopes and ridges, montane conifer woodlands, meadows		None
Eriophorum gracile	slender cottongrass	Cyperaceae	None	None	G5	S4	4.3	Jun-Aug	Wet meadows, bogs	600 - 2900m	None
Erythronium revolutum	coast fawn lily	Liliaceae	None	None	G4G5	S3	2B.2	Mar-Jul	Streambanks, wet places in woodland	< 1350 m	None
Eurybia merita	subalpine aster	Asteraceae	None	None	G5	SH	2B.3	Jul-Aug	Upper montane coniferous forest.	1300-2000 m.	None
Frasera albicaulis var. modocensis	Modoc green-gentian	Gentianaceae	None	None	G5T3T4	S2S3	2B.3	May-Jul	Great Basin scrub, upper montane coniferous forest.	Openings. 900-1750 m.	Moderate
Hesperocyparis bakeri	Baker cypress	Cupressaceae	None	None	G3	S3	4.2	none	Chaparral, Lower montane coniferous forest	Serpentinite (sometimes), Volcanic (sometimes)	None
Hulsea nana	little hulsea	Asteraceae	None	None	G4	S3	2B.3	Jun-Sep	Alpine boulder and rock field, subalpine coniferous forest.	Rocky or gravelly sites; on volcanic substrates. 1705-3170 m.	None
Hymenoxys lemmonii	alkali hymenoxys	Asteraceae	None	None	G4	S2S3	2B.2	(May)Jun-Aug(Sep)	Great Basin scrub, Lower montane coniferous forest, Meadows and seeps		Moderate
Iliamna bakeri	Baker's globe mallow	Malvaceae	None	None	G4	S3	4.2	Jun-Sep	Chaparral, Great Basin scrub, Lower montane coniferous forest, Pinyon and juniper woodland	Burned areas (often), Volcanic	Moderate
Ivesia pickeringii	Pickering's ivesia	Rosaceae	None	None	G2	S2	1B.2	Jul-Aug	Lower montane coniferous forest, meadows and seeps.	Mesic clay; usually serpentine seeps. 850-1525 m.	Low

Appendix 2 Table 2 Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC LSCSD Project, May 20, 2022 Lake Shastina and Surrounding 7.5' Quadrangles											
Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
Lomatium peckianum	Peck's lomatium	Apiaceae	None	None	G4	S1	2B.2	May	Chaparral, cismontane woodland, lower montane coniferous forest, pinyon and juniper woodland.	Rocky slopes, flats, and sometimes grassy openings, in yellow pine-black oak woodland, on volcanic soils. 685-1180 m.	Moderate
Meesia uliginosa	broad-nerved hump moss	Meesiaceae	None	None	G5	S3	2B.2	none	Meadows and seeps, bogs and fens, upper montane coniferous forest, subalpine coniferous forest.	Moss on damp soil. Often found on the edge of fens or raised above the fen on hummocks/shrub bases. 1095-2805 m.	None
Opuntia fragilis	brittle prickly-pear	Cactaceae	None	None	G5	S1	2B.1	Apr-Jul	Pinyon and juniper woodland.	Volcanic soils. 785-820 m.	Moderate
Orthocarpus bracteosus	rosy orthocarpus	Orobanchaceae	None	None	G3	S1	2B.1	Jun-Aug	Meadows and seeps.	1000-2000 m.	None
Orthocarpus pachystachyus	Shasta orthocarpus	Orobanchaceae	None	None	G1	S1	1B.1	May	Great Basin scrub, Meadows and seeps, Valley and foothill grassland		Moderate
Penstemon cinicola	ash beardtongue	Plantaginaceae	None	None	G4	S3	4.3	Jun-Aug	1250-2700 m elevation, igneous soils		None
Penstemon heterodoxus var. shastensis	Shasta beardtongue	Plantaginaceae	None	None	G5T3	S3	4.3	Jun-Aug	Montane meadows	900-2400 m	None
Phacelia cookei	Cooke's phacelia	Hydrophyllaceae	None	None	G1	S1	1B.1	Jun-Jul	Great Basin scrub, Lower montane coniferous forest	Sandy, Volcanic	Moderate
Polemonium pulcherrimum var. shastense	Mt. Shasta sky pilot	Polemoniaceae	None	None	G5T2	S2	1B.2	Jul-Sep	Alpine boulder and rock fields, subalpine and upper and lower montane coniferous forests.	Sometimes volcanic. 2190-3780 m.	None

Appendix 2 Table 2

Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC
LSCSD Project, May 20, 2022
Lake Shastina and Surrounding 7.5' Quadrangles

Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
Potentilla newberryi	Newberry's cinquefoil	Rosaceae	None	None	G3G4	S2S3	2B.3	May-Aug	Marshes and swamps, vernal pools.	Receding shorelines; drying wetland margins. 1285-1930 m.	None
Silene suksdorfii	Cascade alpine campion	Caryophyllaceae	None	None	G4	S3	2B.3	Jun-Sep	Alpine boulder and rock field, subalpine coniferous forest, upper montane coniferous forest.	Rocky, volcanic soils. 1745-3050 m.	None
Stachys pilosa	hairy marsh hedge-nettle	Lamiaceae	None	None	G5	S3	2B.3	Jun-Sep	Great Basin scrub, meadows and seeps.	Mesic sites. 785-2045 m.	Moderate
Thelypodium brachycarpum	short-podded thelypodium	Brassicaceae	None	None	G3	S3	4.2	Apr-Aug	Alkaline soils, adobe flats, pond margins	800-2320 m	Low
Triteleia grandiflora	large-flowered triteleia	Themidaceae	None	None	G4G5	S1	2B.1	Apr-Jun	Great Basin scrub, pinyon and juniper woodland.	In rocky areas in sagebrush scrub, and in woodland. 210-1405 m.	Low
Triteleia hendersonii	Henderson's triteleia	Themidaceae	None	None	G4	S1	2B.2	May-Jul	Cismontane woodland.	Open slopes and roadbanks. 760-1200 m.	Moderate

1. Species indicator status as assigned by Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and California Department of Fish and Wildlife (CDFW)

C: candidate
CT: candidate threatened
D: delisted
DPS: distinct population segment
E: endangered
ESU: evolutionarily significant unit
FP: fully protected
PT: proposed threatened
SSC: species of special concern
T: threatened
WL: watch list
FP: fully protected

Appendix 2 Table 2 Regionally-occurring Special-status Plant Scoping List CNDDB, BIOS, IPaC LSCSD Project, May 20, 2022 Lake Shastina and Surrounding 7.5' Quadrangles											
Scientific Name	Common Name	Family	Fed List	State List	Grank	Srank	Plant Rank	Bloom Period	General Habitat	Micro-Habitat	Potential of Occurrence
2. Species Heritage rank as assigned by California Department of Fish and Wildlife (CDFW) G1/S1: critically imperiled G2/S2: imperiled G3/S3: vulnerable G4/S4: apparently secure G5/S5: secure											

Observed Species List

3

Appendix 3, Table 1
Animal Species Observed 6/22/2022
Lake Shastina Community Services Infrastructure Improvement Project

Scientific Name	Common Name	Nest Habitat	Status
Birds			
Cathertes aura	turkey vulture	Usually rock crevices, caves, ledges, also fallen logs.	NL[a]
Buteo jamaicensis	red-tailed hawk	crowns of tall trees, cliff, ledge, or artificial structure	NL
Passer domesticus	house sparrow	Holes in buildings, streetlights, roofs, overhanging fixtures, vines that climb walls	NL (non-native)
Streptopelia decaocto	Eurasian-collared dove	low canopy in trees or on buildings	NL (non-native)
Poecile atricapillus	black-capped chickadee	small natural cavities, nest boxes, abandoned downy woodpecker cavities	NL
Aphelocoma californica	western scrub jay	low canopy of oak, laurel sumac, madrone, or poison oak	NL
Chordeiles minor	common nighthawk	gravel beaches, rocky outcrops, and open forest floors near logs, boulders, and shrubs	NL
Sturnus vulgaris	European starling	cavity in a building or structure, old woodpecker hole, or a nest box	NL (non-native)
Contopus sordidulus	western wood-peewee	nest in cottonwood, aspen, pinyon pine, walnut, sycamore trees near the ground to more than 80 feet above	NL
Turdus migratorius	American robin	within lower canopy, April-July	NL
Colaptes auratus	northern flicker	Excavate nest holes in dead or diseased tree trunks or branches 6-15 feet off the ground	NL
Spinus psaltria	lesser goldfinch	fork of a branch in cottonwoods or willows along rivers, 4-8 ft or higher off the ground	NL
Junco hyemailis	dark eyed junco	depression or niche on sloping ground, rock face, or amid tangled roots of an upturned tree	NL
Larus californicus	California gull	on the ground in the open or at the based of a small shrub	NL
Larus delawarensis	ring-billed gull	on the ground near freshwater and sparsely vegetated terrain	NL
Thyromanes bewickii	Bewick's wren	nest in cavities or on ledges within 30 ft off the ground	NL
Gymnorhinus cyanocephalus	pinyon jay	nest in ponderosa pine, pinyon pine, and junipers from 3-115 feet above the ground	NL
Haemorphous mexicanus	house finch	nest is various deciduous and coniferous trees as well as on cactus and rock ledges, buildings, and light structures	NL

Appendix 3, Table 1 Animal Species Observed 6/22/2022 Lake Shastina Community Services Infrastructure Improvement Project			
Scientific Name	**Common Name**	**Nest Habitat**	**Status**
Branta canadensis	Canada goose	on the ground slightly elevated near water	NL
Accipiter cooperii	Cooper's hawk	build nest in pines, oaks, Douglas-firs, beeches, and spruces, 25-50 ft off the ground	NL
Pelecanus erythrorhynchos	American white pelican	nest site on gravel, sand, or soil among sparse vegetation or under shrubs or trees, near other pelicans	NL
Nannopterum auritum	double crested cormorant	ground, rocks, or reefs with no vegetations, or atop trees in colonies	NL
Fulica americana	American coot	Built over water on floating platforms with dense stand of vegetations of reeds, cattails, bulrushes, sedges, and grasses	NL
Leucophaeus pipixcan	Franklin's gull	A platform of wet vegetation with a central depression	NL
Psaltriparus minimus	bushtit	nests are on branches or trucks of trees at any height about 3-100 feet	NL
Charadrius vociferus	killdeer	placed on slight rises in open habitats on bare ground	NL
Baeolophus inornatus	oak titmouse	natural cavity in a tree up to 40 ft off the ground	NL
Euphagus cyanocephalus	Brewer's blackbird	Nest in colonies in low shrubs or trees near water, or reeds and cattails	NL
Circus hudsonius	northern harrier	on the ground in a dense clump of vegetation such as willows, grasses, sedges, reeds, bulrushes, and cattails	NL
Pandion haliaetus	osprey	Nests are usually built on snags, treetops, or large cavities between large branches and trunks, human-built platforms, on cliffs	NL
Agelaius phoeniceus	red-winged blackbird	Build nest in marsh vegetation, shrubs, or trees	NL
Zenaida macroura	mourning dove	Nest in dense foliage of evergreen, orchard tree, mesquite, cottonwood, or vine. Also nests on the ground.	NL
Aythya affinis	lesser scaup	Nest on the ground in tall vegetation in prairies, hayfields, fresh and brackish marshes, and lakes with sedges, bulrushes, and cattails. Sometimes build nests on floating mats of vegetation.	NL

Appendix 3, Table 1 Animal Species Observed 6/22/2022 Lake Shastina Community Services Infrastructure Improvement Project			
Scientific Name	**Common Name**	**Nest Habitat**	**Status**
Melospiza melodia	song sparrow	Hidden in grasses or low vegetation.	NL
Pipilo maculatus	spotted towhee	Nests can be on the ground or near it (up to 12 ft high). Often choose a clump of grass next to a log or base of a shrub to conceal their nest.	NL
Molothrus ater	brown-headed cowbird	Lay eggs in other birds' nests. Most common: yellow warbler, song and chipping sparrows, spotted towhees, and red-winged blackbird	NL
Callipepla californica	California quail	Hide nests on the ground amid grasses or at the bases of shrubs and trees.	NL
Mammals			
Lepus californicus	black-tailed jackrabbit	Use a shallow excavation in the ground near mixed grasses, forbs, and shrubs	NL
Odocoileus hemionus	mule deer	Tall grasses for fawns to hide in.	NL
Sciurus griseus	western gray squirrel	Use cavities in snags and trees of oak, fir, or pine trees. Nests are lined with shredded bark, grass, moss, and lichen.	NL
Otospermophilus beecheyi	California ground squirrel	underground burrows	NL

[a] NL: Not listed

Soil Map 4

United States Department of Agriculture

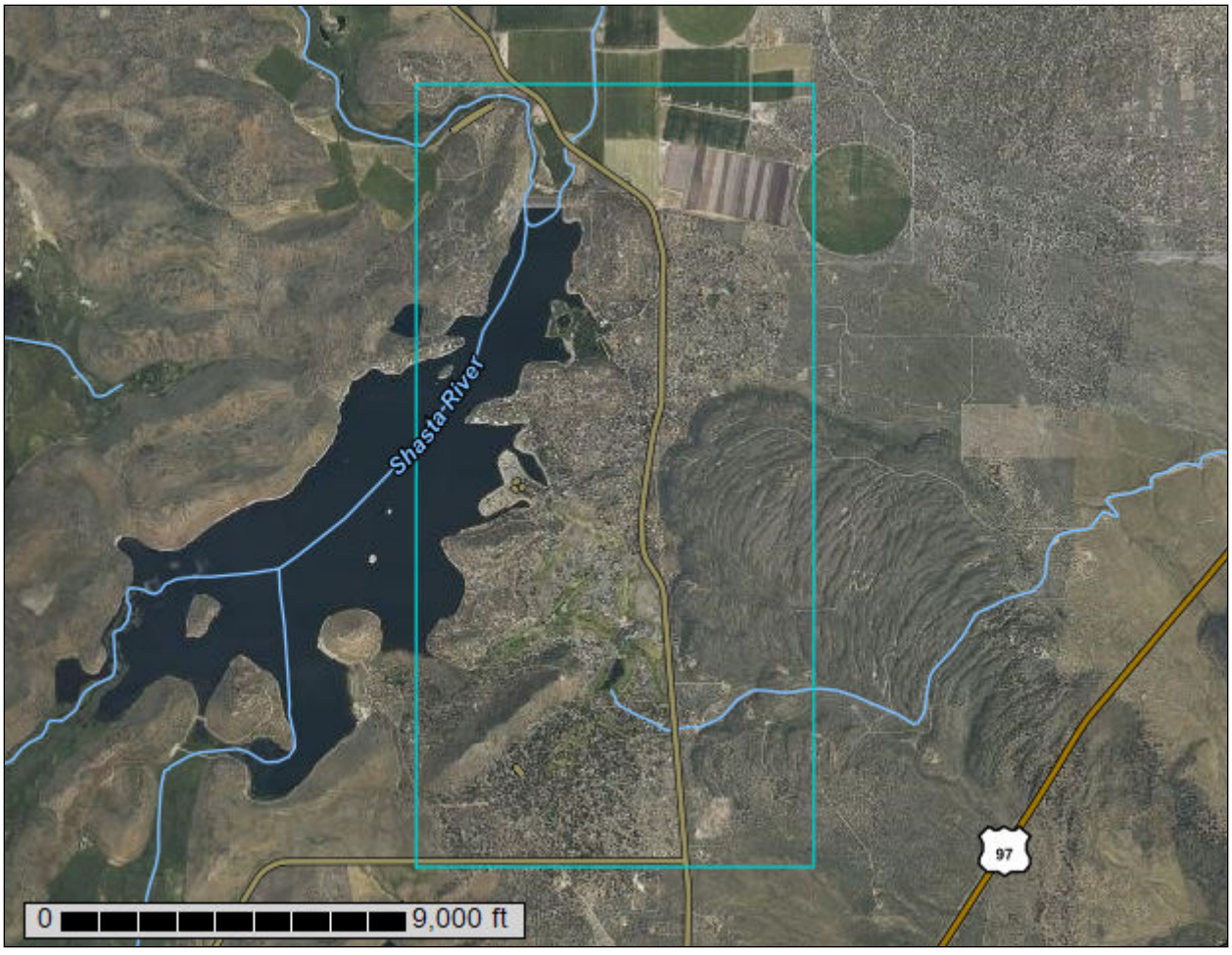
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Siskiyou County, California, Central Part

Lake Shastina Soil Types



July 12, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Siskiyou County, California, Central Part
Survey Area Data: Version 13, Sep 6, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 2, 2019—Jun 21, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
129	Delaney sand, 0 to 9 percent slopes	703.8	14.5%
130	Delaney gravelly sand, 0 to 9 percent slopes	763.3	15.7%
131	Delaney stony sand, 0 to 15 percent slopes	657.0	13.5%
132	Delaney sandy loam, 0 to 2 percent slopes	197.9	4.1%
133	Delaney sandy loam, 2 to 5 percent slopes	16.6	0.3%
134	Delaney variant silt, 0 to 2 percent slopes	94.8	1.9%
175	Lava flows	726.1	14.9%
177	Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes*	19.5	0.4%
185	Mary loam, 2 to 9 percent slopes	0.8	0.0%
187	Mary stony loam, 2 to 50 percent slopes	282.1	5.8%
188	Mary-Rock outcrop complex, 2 to 50 percent slopes	427.3	8.8%
210	Redola loam, 0 to 2 percent slopes	17.8	0.4%
217	Salisbury clay loam, 0 to 2 percent slopes	7.6	0.2%
236	Uhlig variant stony loam, 5 to 50 percent slopes	350.0	7.2%
238	Xerofluvents, nearly level	54.6	1.1%
239	Water	530.8	10.9%
240	Gravel pits	7.8	0.2%
242	Dams	6.8	0.1%
Totals for Area of Interest		**4,864.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named

according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Siskiyou County, California, Central Part

129—Delaney sand, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hdnp
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Delaney and similar soils: 85 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney

Setting

Landform: Outwash fans
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile

H1 - 0 to 9 inches: sand
H2 - 9 to 68 inches: sand

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R021XE088CA - SANDY
Hydric soil rating: No

Minor Components

Plutos

Percent of map unit: 10 percent
Hydric soil rating: No

Rubble land
Percent of map unit: 2 percent
Hydric soil rating: No

Riverwash
Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

Xerofluvents
Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

130—Delaney gravelly sand, 0 to 9 percent slopes

Map Unit Setting
National map unit symbol: hdnq
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition
Delaney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney

Setting
Landform: Outwash fans
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile
H1 - 0 to 9 inches: gravelly sand
H2 - 9 to 44 inches: gravelly sand
H3 - 44 to 68 inches: very gravelly sand

Properties and qualities
Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R021XE088CA - SANDY
Hydric soil rating: No

Minor Components

Plutos

Percent of map unit: 8 percent
Hydric soil rating: No

Rubble land

Percent of map unit: 5 percent
Hydric soil rating: No

Xerofluvents

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

Riverwash

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

131—Delaney stony sand, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: hdnr
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Delaney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney

Setting

Landform: Outwash fans
Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile

H1 - 0 to 9 inches: stony sand
H2 - 9 to 45 inches: gravelly sand
H3 - 45 to 49 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R021XE104CA - STONY SANDS
Hydric soil rating: No

Minor Components

Plutos

Percent of map unit: 10 percent
Hydric soil rating: No

Lava flows

Percent of map unit: 3 percent
Hydric soil rating: No

Xerofluvents

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

Riverwash

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

132—Delaney sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdns
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Delaney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney

Setting

Landform: Outwash fans
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile

H1 - 0 to 9 inches: sandy loam
H2 - 9 to 68 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R021XE160CA - COARSE LOAMY
Hydric soil rating: No

Minor Components

Plutos
Percent of map unit: 10 percent
Hydric soil rating: No

Riverwash
Percent of map unit: 3 percent
Landform: Drainageways
Hydric soil rating: Yes

Xerofluvents
Percent of map unit: 2 percent
Landform: Drainageways
Hydric soil rating: Yes

133—Delaney sandy loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: hdnt
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Delaney and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney

Setting
Landform: Outwash fans
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile
H1 - 0 to 9 inches: sandy loam
H2 - 9 to 68 inches: sand

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R021XE160CA - COARSE LOAMY
Hydric soil rating: No

Minor Components

Plutos

Percent of map unit: 10 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 3 percent
Landform: Drainageways
Hydric soil rating: Yes

Xerofluvents

Percent of map unit: 2 percent
Landform: Drainageways
Hydric soil rating: Yes

134—Delaney variant silt, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdnv
Elevation: 2,800 to 4,500 feet
Mean annual precipitation: 10 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Delaney variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Delaney Variant

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Glaciofluvial deposits derived from igneous rock

Typical profile

H1 - 0 to 7 inches: silt
H2 - 7 to 14 inches: loamy fine sand
H3 - 14 to 22 inches: silt
H4 - 22 to 34 inches: loamy sand
H5 - 34 to 53 inches: sandy loam
H6 - 53 to 60 inches: coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: R021XE131CA - LOAMY
Hydric soil rating: No

Minor Components

Plutos

Percent of map unit: 5 percent
Hydric soil rating: No

Delaney

Percent of map unit: 5 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 3 percent
Landform: Alluvial fans
Hydric soil rating: Yes

Xerofluvents

Percent of map unit: 2 percent
Landform: Drainageways
Hydric soil rating: Yes

175—Lava flows

Map Unit Composition

Lava flows: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lava Flows

Setting

Landform: Lava fields
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pahoehoe lava

Typical profile

H1 - 0 to 60 inches: fragmental material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Mart

Percent of map unit: 5 percent
Hydric soil rating: No

Jilson

Percent of map unit: 5 percent
Hydric soil rating: No

177—Lithic Haploxerolls-Rock outcrop complex, 0 to 65 percent slopes*

Map Unit Setting

National map unit symbol: hdq7
Elevation: 2,000 to 6,000 feet
Mean annual precipitation: 20 to 50 inches
Mean annual air temperature: 48 to 52 degrees F

Frost-free period: 60 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Lithic haploxerolls, very stony loam, and similar soils: 40 percent
Rock outcrop: 30 percent
Minor components: 29 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lithic Haploxerolls, Very Stony Loam

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from igneous and metamorphic rock

Typical profile

H1 - 0 to 3 inches: very stony sandy loam
H2 - 3 to 10 inches: very stony sandy loam
H3 - 10 to 10 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 65 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F022BF201CA - Ash-influenced, warm (FFD>100) rocky mountains
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Igneous and metamorphic rock

Typical profile

H1 - 0 to 10 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 65 percent

Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 14 percent
Hydric soil rating: No

Rubble land

Percent of map unit: 10 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 5 percent
Landform: Drainageways
Hydric soil rating: Yes

185—Mary loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hdqh
Elevation: 2,500 to 4,500 feet
Mean annual precipitation: 18 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 110 to 140 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Mary and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mary

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 24 inches: clay loam
H3 - 24 to 28 inches: sandy clay loam
H4 - 28 to 32 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R022AF032CA - LOAMY
Hydric soil rating: No

Minor Components

Hilt

Percent of map unit: 5 percent
Hydric soil rating: No

Kuck

Percent of map unit: 5 percent
Hydric soil rating: No

Terwilliger

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

187—Mary stony loam, 2 to 50 percent slopes

Map Unit Setting

National map unit symbol: hdqk
Elevation: 2,500 to 4,500 feet
Mean annual precipitation: 18 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 110 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Mary and similar soils: 80 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mary

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 10 inches: stony loam
H2 - 10 to 24 inches: clay loam
H3 - 24 to 28 inches: sandy clay loam
H4 - 28 to 32 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 50 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R022AF068CA - STONY LOAM
Hydric soil rating: No

Minor Components

Terwilliger

Percent of map unit: 5 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Hilt

Percent of map unit: 5 percent
Hydric soil rating: No

188—Mary-Rock outcrop complex, 2 to 50 percent slopes

Map Unit Setting

National map unit symbol: hdql
Elevation: 2,500 to 4,500 feet
Mean annual precipitation: 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 110 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Mary and similar soils: 40 percent
Rock outcrop: 25 percent
Minor components: 29 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mary

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 10 inches: stony loam
H2 - 10 to 24 inches: clay loam
H3 - 24 to 28 inches: sandy clay loam
H4 - 28 to 32 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 50 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R022AF068CA - STONY LOAM

Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from igneous rock

Typical profile

H1 - 0 to 4 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 50 percent
Depth to restrictive feature: 0 to 4 inches to lithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 14 percent
Hydric soil rating: No

Hilt

Percent of map unit: 10 percent
Hydric soil rating: No

Terwilliger

Percent of map unit: 5 percent
Hydric soil rating: No

210—Redola loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdr9
Elevation: 2,500 to 4,000 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 125 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Redola and similar soils: 85 percent
Minor components: 11 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Redola

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 13 inches: loam
H2 - 13 to 39 inches: stratified sandy loam to clay loam
H3 - 39 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): 2s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: B
Ecological site: R021XE160CA - COARSE LOAMY
Hydric soil rating: No

Minor Components

Delaney variant

Percent of map unit: 5 percent
Hydric soil rating: No

Delaney

Percent of map unit: 5 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

217—Salisbury clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hdrj
Elevation: 2,500 to 4,500 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 48 degrees F
Frost-free period: 125 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Salisbury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Salisbury

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 4 inches: clay loam
H2 - 4 to 24 inches: clay
H3 - 24 to 32 inches: indurated
H4 - 32 to 60 inches: stratified sand to stony sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R021XE074CA - FINE LOAMY

Hydric soil rating: No

Minor Components

Kuck

Percent of map unit: 5 percent
Hydric soil rating: No

Lassen

Percent of map unit: 5 percent
Hydric soil rating: No

Mary

Percent of map unit: 3 percent
Hydric soil rating: No

Medford

Percent of map unit: 2 percent
Hydric soil rating: No

236—Uhlig variant stony loam, 5 to 50 percent slopes

Map Unit Setting

National map unit symbol: hds4
Elevation: 2,500 to 4,000 feet
Mean annual precipitation: 13 inches
Mean annual air temperature: 50 degrees F
Frost-free period: 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Uhlig variant and similar soils: 75 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Uhlig Variant

Setting

Landform: Terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 14 inches: stony loam
H2 - 14 to 42 inches: stony loam
H3 - 42 to 46 inches: weathered bedrock

Properties and qualities

Slope: 5 to 50 percent

Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R022AF068CA - STONY LOAM
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Hydric soil rating: No

Redola

Percent of map unit: 5 percent
Hydric soil rating: No

Delaney

Percent of map unit: 5 percent
Hydric soil rating: No

238—Xerofluvents, nearly level

Map Unit Setting

National map unit symbol: hds6
Elevation: 2,020 to 5,080 feet
Mean annual precipitation: 17 to 50 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents and similar soils: 75 percent
Minor components: 24 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents

Setting

Landform: Flood plains

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous, metamorphic and sedimentary rock

Typical profile

H1 - 0 to 10 inches: gravelly loamy sand
H2 - 10 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 14 percent
Landform: Flood plains
Hydric soil rating: Yes

Deetz

Percent of map unit: 4 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Diyou

Percent of map unit: 2 percent
Landform: Flood plains
Hydric soil rating: Yes

Rubble land

Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

239—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

240—Gravel pits

Map Unit Composition

Gravel pits: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gravel Pits

Setting

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Igneous, metamorphic and sedimentary rock

242—Dams

Map Unit Composition

Dams: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Eureka, CA | Arcata, CA | Redding, CA | Willits, CA | Fort Bragg, CA | Coos Bay, OR | Klamath Falls, OR