Big River Salmonid Rearing Habitat and Large Wood Enhancement Project Designs 2020

Introduction:

Trout Unlimited, Inc. (Permittee) will implement the Big River Salmonid Rearing Habitat and Large Wood Enhancement Design Project. The goal of the project is to restore salmonid habitat complexity in a three-mile reach of mainstem Big River by installing moderate to large-scale engineered log jam structures (ELJ). These structures will be used to create habitat diversity and flow complexity for Coho Salmon, steelhead trout, and Chinook Salmon to improve both summer and winter rearing conditions.

The Permittee shall not proceed with on the ground implementation until all necessary permits, consultations, and Notice to Proceed are secured. All habitat improvements will follow techniques in the *California Salmonid Stream Habitat Restoration Manual* (Vol. I, Part VII https://www.wildlife.ca.gov/Grants/FRGP/Guidance).

Objectives:

The project objective is to design ELJs in a three-mile reach of Big River that, once implemented, will develop a complex channel bed with deep pools, physical shelter, promote diversity in flow velocity structure, and locally raise the water surface elevation to increase floodplain connectivity. As feasible, the proposed ELJs will be used to augment tributary off-channel habitat in two tributaries at their confluence with Big River.

Project Description:

Location:

The project is located along a section of Big River, located in the county of Mendocino, State of California. The project starts approximately 16.5-miles upstream from the Pacific Ocean and extends upstream three miles. The center point of the project is 39.3236º north latitude, -123.6396º west longitude and is located on the Mathison Peak 7.5 Minute U.S. Geological Survey (USGS) Quadrangle map.

Project Set Up:

The Permittee will provide all technical and administrative services associated with performing and completing the proposed work, including managing the grant agreement, delivering the final landowner access agreement, administering subcontracts, invoicing and payments, drafting and finalizing progress and final reports, and data management. Permittee will coordinate all communication with and between the landowner, stakeholders, and regulatory agencies, as well as provide guidance on fisheries biology and large wood loading objectives.

Subcontractor Mike Love and Associates (MLA) will lead the hydrologic, hydraulic, and fluvial geomorphic analysis, and develop the engineering plans and basis of design report. MLA will participate in field activities, and lead the risk assessment and development of designs. MLA will perform the geomorphic assessment, designing the ELJs, developing the hydraulic modeling, and conducting the force-balance calculations, prepare the project basemap, lead the preparation of design drawings for each structure, conduct surveys, drafting, processing of collected field data, performing hydrologic and force-balance calculations, and prepare figures.

Subcontractor Pacific Watershed Associates (PWA) will lead the engineering geologic investigations in support of engineering designs which aids in the assessment of geological constraints and risks to, and resulting from, implementation of the project. PWA staff will support Permittee and MLA primarily with geological site characterizations and wetlands delineations. The engineering geologic investigation includes characterizing the geology and adjacent hillslope and channel geomorphology, shallow stratigraphic conditions and grain size distributions, and physical soil and earth materials characteristics. Characterization of channel geomorphology and identification of channel materials properties will aid MLA in understanding how the proposed ELJ structures will affect flow velocities, water surface elevations, shear stress, and potential bed deformation along the project reach.

Materials:

MLA will lease use of a Trimble robotic total station for conducting a topographic survey of the project area. Materials necessary for conducting the survey include stakes, rebar, flagging, and paint for establishing and marking permanent survey monuments. PWA will procure the LSAA permit and a hollow stem auger of for subsurface geologic investigations (drilling) as well as materials associated with travel (e.g. lodging, per diem, mileage), field supplies, reporting supplies, and soil lab testing fees. Field supplies will include maps and plan prints, flagging, staking, paint, field notebooks, and photographic supplies.

Tasks:

Task 1. Geotechnical Investigation:
PWA will subcontract an environmental drilling company to utilize a track mounted drill rig to conduct subsurface investigations at Big River channel locations determined to be feasible preferred locations for ELJ design by PWA and MLA. Subsurface investigations with a hollow stem auger will be performed at up to 10 locations within the Big River channel to investigate subsurface conditions and stratigraphy, identify potential limitations to pile placement depth, and collect samples and site data to inform the design process. In-situ standard penetration testing will be performed to measure penetration resistance of

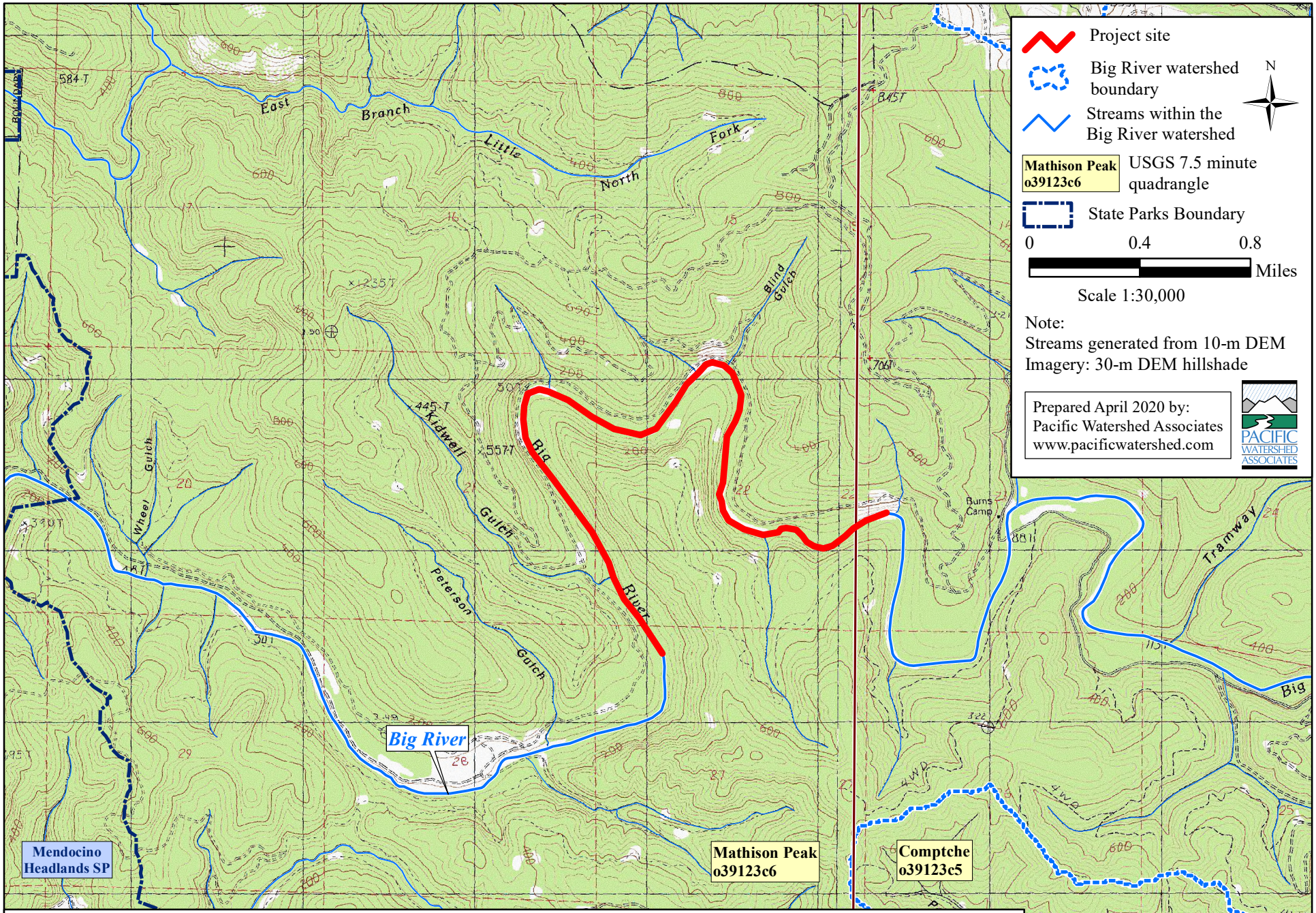
channel materials and correlation with materials engineering properties. PWA will provide exclusion and/or relocation of fish and amphibians as necessary to permit the drill rig to make limited crossings of shallow water to access investigation areas. PWA staff will employ turbidity, water quality and erosion control measures as necessary to protect aquatic habitat and water quality during subsurface investigations. If desirable ELJ locations are identified where conditions are found to not permit suitable drill rig access to channel investigation sites, PWA may subcontract a backhoe, small excavator, or portable drill rig to conduct alternate subsurface investigations. PWA will use a hand auger or heavy equipment in the investigation and sampling of streambank materials to characterize and evaluate engineering properties of bed and bank materials for application in bank-supported design components.

Deliverables:

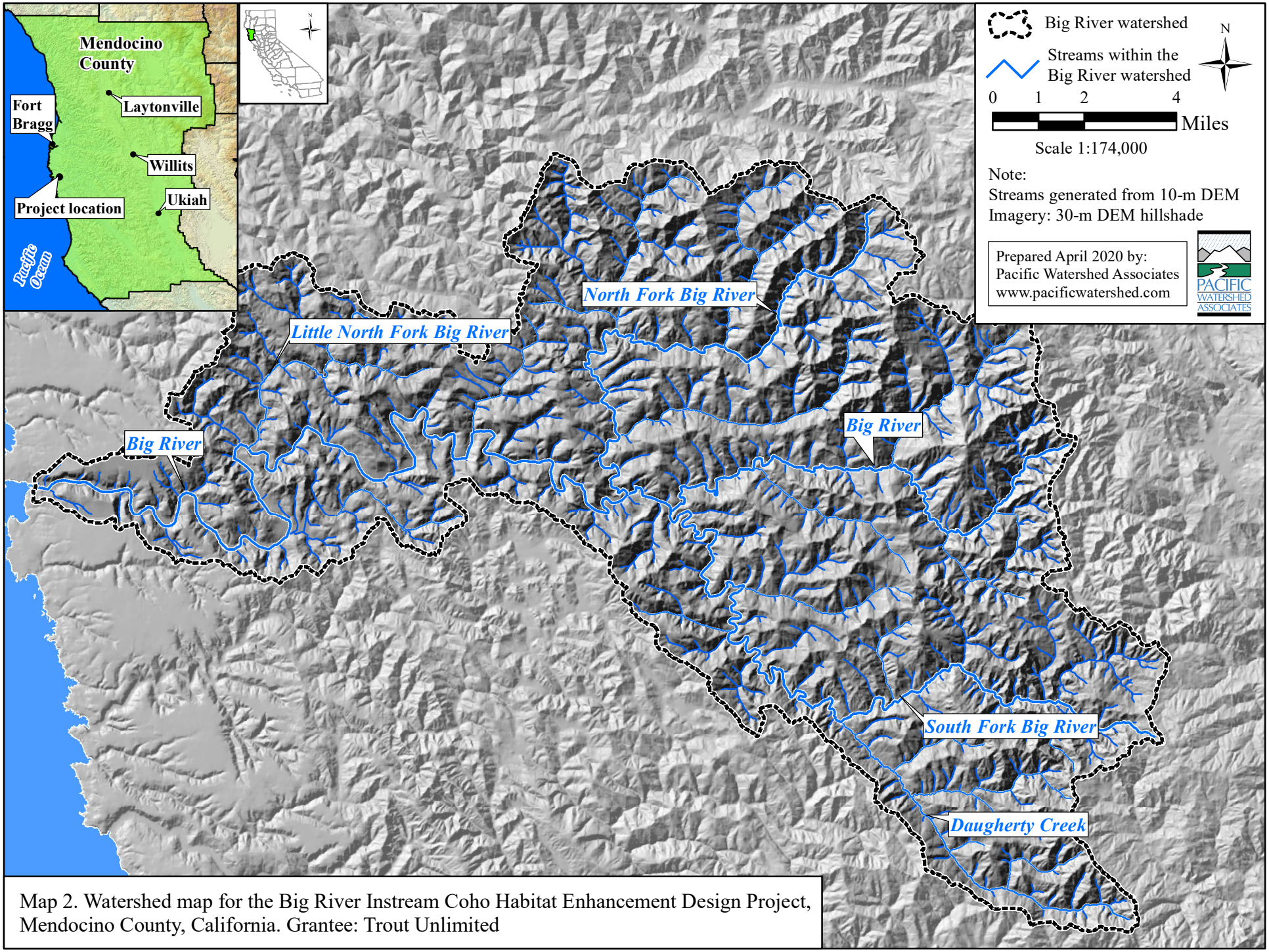
Engineering Geologic Technical Memorandum. The background studies, site geologic characterization, subsurface investigation, and soil and substrate conditions analysis will all be summarized into a brief engineering geologic technical memorandum (TM) that includes the methods, findings, constraints and recommendations for design and construction. The TM will be used by the project engineers to develop technical specifications and identify potential project constraints for the proposed large wood habitat enhancement project. A draft report will be submitted to the stakeholders and finalized upon addressing written comments received by the group.

Timelines:

July 29, 2022 through October 28, 2022, PWA will conduct surface investigations.



Map 1. Project Location Topographic Map for the Big River Instream Coho Habitat Enhancement Design Project, Mendocino County, California. Mathison Peak USGS 7.5' quadrangles. Grantee: Trout Unlimited



Map 2. Watershed map for the Big River Instream Coho Habitat Enhancement Design Project, Mendocino County, California. Grantee: Trout Unlimited

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Mathison Peak (3912336) OR Elk (3912326) OR Albion (3912327) OR Mendocino (3912337) OR Fort Bragg (3912347) OR Noyo Hill (3912346) OR Northspur (3912345) OR Comptche (3912335) OR Navarro (3912325))

Possible species within the Mathison Peak and surrounding quads for 1723369 - Big River Salmonid Rearing Habitat and Large Wood Enhancement Project Designs, Mendocino County

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Abronia umbellata var. breviflora pink sand-verbena	PDNYC010N4	None	None	G4G5T2	S2	1B.1
Accipiter gentilis northern goshawk	ABNKC12060	None	None	G5	S3	SSC
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G2G3	S1S2	SSC
Agrostis blasdalei Blasdale's bent grass	PMPOA04060	None	None	G2	S2	1B.2
Arborimus pomo Sonoma tree vole	AMAFF23030	None	None	G3	S3	SSC
Arctostaphylos nummularia ssp. mendocinoensis pygmy manzanita	PDERI04280	None	None	G3?T1	S1	1B.2
Ascaphus truei Pacific tailed frog	AAABA01010	None	None	G4	S3S4	SSC
Astragalus agnicidus Humboldt County milk-vetch	PDFAB0F080	None	Endangered	G2	S2	1B.1
Atractelmis wawona Wawona riffle beetle	IICOL58010	None	None	G3	S1S2	
Blennosperma nanum var. robustum Point Reyes blennosperma	PDAST1A022	None	Rare	G4T2	S2	1B.2
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G4?	S1S2	
Bombus occidentalis western bumble bee	IIHYM24250	None	Candidate Endangered	G2G3	S1	
Brachyramphus marmoratus marbled murrelet	ABNNN06010	Threatened	Endangered	G3G4	S1	
Calamagrostis crassiglumis Thurber's reed grass	PMPOA17070	None	None	G3Q	S2	2B.1
Calileptoneta wapiti Mendocino leptonetid spider	ILARAU6040	None	None	G1	S1	
Calystegia purpurata ssp. saxicola coastal bluff morning-glory	PDCON040D2	None	None	G4T2T3	S2S3	1B.2
Campanula californica swamp harebell	PDCAM02060	None	None	G3	S3	1B.2
Carex californica California sedge	PMCYP032D0	None	None	G5	S2	2B.2
Carex lenticularis var. limnophila lagoon sedge	PMCYP037A7	None	None	G5T5	S1	2B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Carex livida livid sedge	PMCYP037L0	None	None	G5	SH	2A
Carex lyngbyei Lyngbye's sedge	PMCYP037Y0	None	None	G5	S3	2B.2
Carex saliniformis deceiving sedge	PMCYP03BY0	None	None	G2	S2	1B.2
Castilleja ambigua var. humboldtiensis Humboldt Bay owl's-clover	PDSCR0D402	None	None	G4T2	S2	1B.2
Castilleja litoralis Oregon coast paintbrush	PDSCR0D012	None	None	G3	S3	2B.2
Castilleja mendocinensis Mendocino Coast paintbrush	PDSCR0D3N0	None	None	G2	S2	1B.2
Charadrius alexandrinus nivosus western snowy plover	ABNNB03031	Threatened	None	G3T3	S2S3	SSC
Chorizanthe howellii Howell's spineflower	PDPGN040C0	Endangered	Threatened	G1	S1	1B.2
Clarkia amoena ssp. whitneyi Whitney's farewell-to-spring	PDONA05025	None	None	G5T1	S1	1B.1
Coastal and Valley Freshwater Marsh Coastal and Valley Freshwater Marsh	CTT52410CA	None	None	G3	S2.1	
Coastal Brackish Marsh Coastal Brackish Marsh	CTT52200CA	None	None	G2	S2.1	
Coelus globosus globose dune beetle	IICOL4A010	None	None	G1G2	S1S2	
Collinsia corymbosa round-headed Chinese-houses	PDSCR0H060	None	None	G1	S1	1B.2
Coptis laciniata Oregon goldthread	PDRAN0A020	None	None	G4?	S3?	4.2
Cornus canadensis bunchberry	PDCOR01040	None	None	G5	S2	2B.2
Corynorhinus townsendii Townsend's big-eared bat	AMACC08010	None	None	G3G4	S2	SSC
Cuscuta pacifica var. papillata Mendocino dodder	PDCUS011A2	None	None	G5T1	S1	1B.2
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Erethizon dorsatum North American porcupine	AMAFJ01010	None	None	G5	S3	
Erigeron supplex supple daisy	PDAST3M3Z0	None	None	G2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Erysimum concinnum bluff wallflower	PDBRA160E3	None	None	G3	S2	1B.2
Erysimum menziesii Menzies' wallflower	PDBRA160R0	Endangered	Endangered	G1	S1	1B.1
Erythronium revolutum coast fawn lily	PMLIL0U0F0	None	None	G4G5	S3	2B.2
Eucyclogobius newberryi tidewater goby	AFCQN04010	Endangered	None	G3	S3	SSC
Fratercula cirrhata tufted puffin	ABNNN12010	None	None	G5	S1S2	SSC
Gilia capitata ssp. pacifica Pacific gilia	PDPLM040B6	None	None	G5T3	S2	1B.2
Gilia millefoliata dark-eyed gilia	PDPLM04130	None	None	G2	S2	1B.2
Grand Fir Forest Grand Fir Forest	CTT82120CA	None	None	G1	S1.1	
Helminthoglypta arrosa pomoensis Pomo bronze shoulderband	IMGASC2033	None	None	G2G3T1	S1	
Hemizonia congesta ssp. congesta congested-headed hayfield tarplant	PDAST4R065	None	None	G5T2	S2	1B.2
Hesperevax sparsiflora var. brevifolia short-leaved evax	PDASTE5011	None	None	G4T3	S3	1B.2
Hesperocyparis pygmaea pygmy cypress	PGCUP04032	None	None	G1	S1	1B.2
Horkelia marinensis Point Reyes horkelia	PDROS0W0B0	None	None	G2	S2	1B.2
Juncus supiniformis hair-leaved rush	PMJUN012R0	None	None	G5	S1	2B.2
Kopsiopsis hookeri small groundcone	PDORO01010	None	None	G4?	S1S2	2B.3
Lasthenia californica ssp. bakeri Baker's goldfields	PDAST5L0C4	None	None	G3T1	S1	1B.2
Lasthenia californica ssp. macrantha perennial goldfields	PDAST5L0C5	None	None	G3T2	S2	1B.2
Lathyrus palustris marsh pea	PDFAB250P0	None	None	G5	S2	2B.2
Lavinia symmetricus navarroensis Navarro roach	AFCJB19023	None	None	G4T1T2	S2S3	SSC
Lilium maritimum coast lily	PMLIL1A0C0	None	None	G2	S2	1B.1
Lycopodium clavatum running-pine	PPLYC01080	None	None	G5	S3	4.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Mendocino Pygmy Cypress Forest Mendocino Pygmy Cypress Forest	CTT83161CA	None	None	G2	S2.1	
Microseris borealis northern microseris	PDAST6E030	None	None	G5	S1	2B.1
Mitellastra caulescens leafy-stemmed mitrewort	PDSAX0N020	None	None	G5	S4	4.2
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
Noyo intersessa Ten Mile shoulderband	IMGASC5070	None	None	G2	S2	
Oceanodroma homochroa ashy storm-petrel	ABNDC04030	None	None	G2	S2	SSC
Oncorhynchus kisutch pop. 4 coho salmon - central California coast ESU	AFCHA02034	Endangered	Endangered	G4	S2?	
Oncorhynchus mykiss irideus pop. 16 steelhead - northern California DPS	AFCHA0209Q	Threatened	None	G5T2T3Q	S2S3	
Packera bolanderi var. bolanderi seacoast ragwort	PDAST8H0H1	None	None	G4T4	S2S3	2B.2
Pandion haliaetus osprey	ABNKC01010	None	None	G5	S4	WL
Phacelia insularis var. continentis North Coast phacelia	PDHYD0C2B1	None	None	G2T2	S2	1B.2
Pinus contorta ssp. bolanderi Bolander's beach pine	PGPIN04081	None	None	G5T2	S2	1B.2
Piperia candida white-flowered rein orchid	PMORC1X050	None	None	G3	S3	1B.2
Plebejus idas lotis lotis blue butterfly	IILEPG5013	Endangered	None	G5TH	SH	
Pleuropogon hooverianus North Coast semaphore grass	PMPOA4Y070	None	Threatened	G2	S2	1B.1
Progne subis purple martin	ABPAU01010	None	None	G5	S3	SSC
Puccinellia pumila dwarf alkali grass	PMPOA531L0	None	None	G4?	SH	2B.2
Ramalina thrausta angel's hair lichen	NLLEC3S340	None	None	G5?	S2S3	2B.1
Rana aurora northern red-legged frog	AAABH01021	None	None	G4	S3	SSC
Rana boylii foothill yellow-legged frog	AAABH01050	None	Endangered	G3	S3	SSC
Rhyacotriton variegatus southern torrent salamander	AAAAJ01020	None	None	G3G4	S2S3	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Rhynchospora alba white beaked-rush	PMCYP0N010	None	None	G5	S2	2B.2
Sanguisorba officinalis great burnet	PDROS1L060	None	None	G5?	S2	2B.2
Sidalcea calycosa ssp. rhizomata Point Reyes checkerbloom	PDMAL11012	None	None	G5T2	S2	1B.2
Sidalcea malachroides maple-leaved checkerbloom	PDMAL110E0	None	None	G3	S3	4.2
Sidalcea malviflora ssp. patula Siskiyou checkerbloom	PDMAL110F9	None	None	G5T2	S2	1B.2
Sidalcea malviflora ssp. purpurea purple-stemmed checkerbloom	PDMAL110FL	None	None	G5T1	S1	1B.2
Speyeria zerene behrensii Behren's silverspot butterfly	IILEPJ6088	Endangered	None	G5T1	S1	
Sphagnum Bog Sphagnum Bog	CTT51110CA	None	None	G3	S1.2	
Taricha rivularis red-bellied newt	AAAAF02020	None	None	G4	S2	SSC
Trifolium buckwestiorum Santa Cruz clover	PDFAB402W0	None	None	G2	S2	1B.1
Trifolium trichocalyx Monterey clover	PDFAB402J0	Endangered	Endangered	G1	S1	1B.1
Triquetrella californica coastal triquetrella	NBMUS7S010	None	None	G2	S2	1B.2
Usnea longissima Methuselah's beard lichen	NLLEC5P420	None	None	G4	S4	4.2
Viola palustris alpine marsh violet	PDVIO041G0	None	None	G5	S1S2	2B.2

Record Count: 96