

Species: *Abies amabilis* (Douglas ex Loudon) J. Forbes,
Pacific silver fir



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Status

Table 1 summarizes the current status of this species or subspecies/variety by various ranking entities and defines the meaning of the status.

Table 1. Current status of Pacific silver fir		
Entity	Status	Status Definition
NatureServe CA ^a	G5? S2	G5: Secure — Common; widespread and abundant. S2: Imperiled — Imperiled in the state because of rarity due to very restricted range, very few

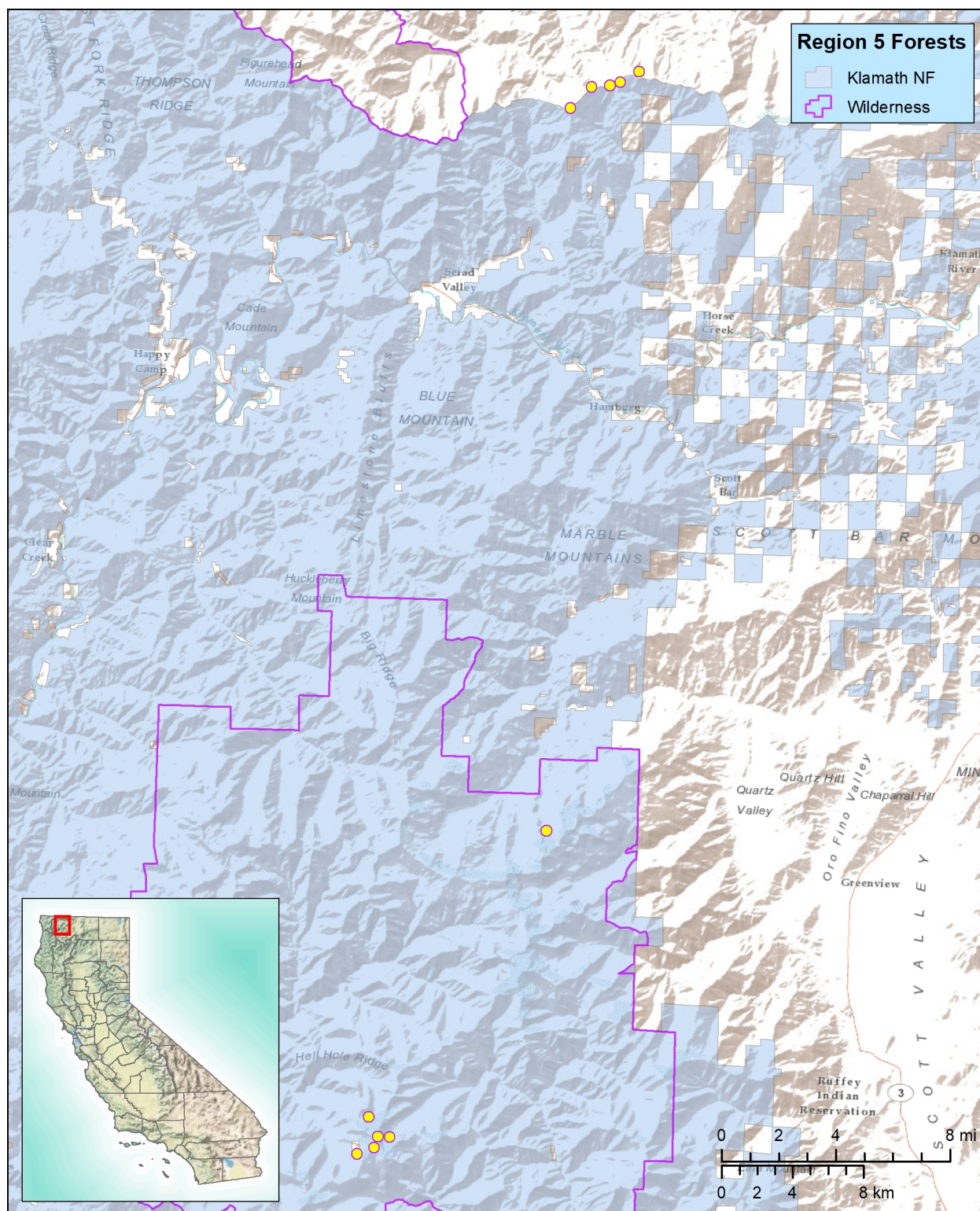
		populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
California Rare Plant Rank ^b	2B.3	2B: Plants rare, threatened, or endangered in California, but more common elsewhere. 0.3: Not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known) Added to <i>CNPS Inventory</i> in 1974; no recent change in status.
California State Listing ^c	Not listed	
USDA Forest Service ^d	Not listed	
USDI FWS ^e	Not listed	
USDI BLM ^f	Not listed	
NatureServe OR, NatureServe Explorer ^g	S5	S5: Secure — Common, widespread, and abundant in the state.
Oregon State Listing ^h	Not listed	
NatureServe NV ⁱ	Not present	
Nevada State Listing ^j	Not present	
^a California Natural Diversity Database, California Dept. of Fish & Wildlife [CNDDDB 2020] ^b California Native Plant Society [CNPS 2020] ^c California Department of Fish and Wildlife [CDFW 2020] ^d US Forest Service Region 5 Forester's List [USDA 2013] and Pacific NW Survey and Manage [USDA & BLM 2014] ^e US Department of Interior Fish and Wildlife Service [USFWS 2020] ^f US Department of Interior Bureau of Land Management [BLM 2020] ^g Oregon Biological Information Center [ORBIC 2019] and NatureServe Explorer [2020] ^h Oregon Department of Agriculture [ODA 2018] ⁱ Nevada Natural Heritage Program [NNHP 2020] ^j Nevada Division of Forestry [NDF 2012] Note: Individual State Heritage Programs (CNDDDB, ORBIC, NNHP) represent NatureServe and contain more up-to-date ranks for their state than NatureServe Explorer.		

Distribution, abundance, and population trend on the planning unit¹

Table 2 summarizes the distribution and frequency of this species or subspecies/variety within National Forest System Lands in California. Table 4 in Appendix 1 lists all known occurrences of this species or subspecies/variety within California. Individual occurrences are defined as sites that contain an individual, population, or groups of populations of the plant that are located more than 1/4 (0.25) of a mile apart from each other as defined by the CNDDDB.

¹ 1909.12 Chapter 10, Section 12.53, components 2, 3, and 4.

Table 2. Known occurrence frequency of Pacific silver fir within the Planning Area (NRIS, CNDDDB, Calflora/CCH databases).							
National Forest System (NFS) lands	Record #s (from Locations table below)	CNDDDB EOs	Non-CNDDDB Records	Recent (seen in past 20 years)	Historical (not seen in past 20 years)	Most Recent Obs. Date	Total Records on NFS lands
Klamath:	1, 2, 3, 4, 10, 11	4	2	2	4	4-Sep-2019	6
Rogue River-Siskiyou:	5, 6, 7, 8, 9	5	0	1	4	12-Aug-2011	5
Totals:	N/A	9	2	3	8	N/A	11



Sources: *Distribution:* Calflora 2020, CNDDDB 2020. *Baselayers:* 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.

Pacific silver fir was last updated in the CNDDDB on July 16, 1997 (CNDDDB 2020), and therefore all Calflora, CCH, and/or NRIS records prior to this date are assumed to have already been reviewed and entered into the CNDDDB for this plant. Accordingly, only records from Calflora, CCH, and/or NRIS reported after this date have been reviewed for potential new or updated occurrence information and are included in Table 4 in Appendix 1 as applicable.

Pacific silver fir ranges from extreme southeastern Alaska southward through coastal British Columbia and Vancouver Island, the Olympic and Cascade mountains of Washington state, and the Cascade Range of Oregon, reaching its southern limit in northern California where it is rare and restricted to isolated groves or stands in the Klamath Ranges (KR) bioregion (Crawford and Oliver 1990, Cope 1992, Hunt 1993, Kauffmann 2013, JEPS 2020). In California, it is found only in western Siskiyou County with two main areas of distribution: (1) along the crest of the Siskiyou Mountains east of Cook and Green Pass, and (2) in the Marble Mountains near Hancock Lake (Griffin and Critchfield 1972, Langer 1988, Kauffmann 2012, CNDDDB 2020). All of the Californian occurrences of Pacific silver fir are at least partly on National Forest land. These fir stands were recently mapped in detail by Michael Kauffmann (2019a, 2019b) in cooperation with the Klamath National Forest and the CNPS Vegetation Team.

Five occurrences are located along the Siskiyou Crest (Rogue River-Siskiyou National Forest). The large stand on the north slope of Black Mountain (EO # 5) was described as a “pure forest of Pacific silver fir” (Langer 1988). The total area of fir stands in the Siskiyou was estimated at 3.5 hectares (8.6 acres) (Kauffmann 2019b).

Another three occurrences are located within the Marble Mountain Wilderness (Klamath National Forest). The Diamond Lake/Hancock Lake stand was described as forming “nearly pure groves” (Kauffmann 2012). Two location records (near Upper English Lake and above Toms Lake, record #s 10 and 11) are based on Calflora observations made in September 2019; roughly 101–1000 trees were seen at each of these locations (which seem to represent new occurrences and should perhaps be evaluated for inclusion in the CNDDDB). The total area of Pacific silver fir stands in the Marble Mountains was estimated at 6.9 hectares (17 acres) (Kauffmann 2019b).

Yet another isolated occurrence (EO # 4) near Deep Lake in the northern Marble Mountains was based on a single herbarium collection (*Muth s.n.* on August 5, 1969; PUA #2644, CAS-BOT-BC77939) that may not be correctly identified. Other collections and observations from the same vicinity have been determined as *Abies lasiocarpa* var. *lasiocarpa* (Kauffmann 2012, CNDDDB 2020). The Deep Lake occurrence of Pacific silver fir should thus be regarded as questionable, and an earlier report of this species from near Ukonom Lake (Griffin and Critchfield 1972) is also seemingly in error (M. Kauffmann 2020, pers. comm.).

Brief description of natural history and key ecological functions²

Pacific silver fir is an evergreen, needle-leaved, coniferous tree that grows to 75 m tall and with trunk to 2.6 m in diameter (Hunt 1993, JEPS 2020). In the northernmost part of its range, it is

² Basis for other 1909.12 Chapter 10, Section 12.53 components.

common in temperate rainforest areas at or near sea level, but to the south it is found at progressively higher elevations, e.g. in the subalpine zone of the Oregon Cascades (Crawford and Oliver 1990, Kauffmann 2012). In California, it generally inhabits upper montane and subalpine forests at 1700–2140 m elevation (Griffin and Critchfield 1972, CNPS 2020, CNDDDB 2020, JEPS 2020). The habitat is further restricted to cool, moist, north-facing slopes with heavy winter snowpack (Kauffmann 2012). It has been described as a subclimax or climax species, i.e., an indicator of mature, undisturbed forest stands (Cope 1992). Along the Siskiyou crest, the most common tree associates are noble fir (*Abies procera*) and mountain hemlock (*Tsuga mertensiana*), with white fir (*A. concolor*), Douglas-fir (*Pseudotsuga menziesii*), sugar pine (*Pinus lambertiana*), Jeffrey pine (*P. jeffreyi*), western white pine (*P. monticola*), and incense cedar (*Calocedrus decurrens*) on rocky and warmer exposures (Langer 1988, Kauffmann 2012). Common associates in the Marble Mountains include mountain hemlock and Shasta red fir (*Abies magnifica* var. *shastensis*), with Brewer spruce (*Picea breweriana*) occurring on the edges of the denser forest (Kauffmann 2012).

The fir genus *Abies* holds about 50 species and is a major component of the boreal and higher-elevation forests of the Northern Hemisphere. Based on molecular phylogenetic studies (Xiang et al. 2009, 2015; Semerikova et al. 2018), the sister species of Pacific silver fir is evidently *A. mariesii* (a native of Honshu island in Japan). This species-pair is a good example of the repeated pattern of plant disjunctions between western North America and eastern Asia (Wen et al. 2016). *Abies amabilis* and *A. mariesii* have also been classified together in the section *Amabilis* (Farjon and Rushforth 1989, Xiang et al. 2018).

Pacific silver fir is like most other conifers in being *monoecious*, meaning that the pollen cones and seed cones are borne on the same tree. The seed cones are wind-pollinated. The species has a 2-year reproductive cycle, with pollen-cone and seed-cone buds beginning to develop in May of the first year, then becoming dormant over the winter; pollen is released in May to June of the second year, and seed cones are receptive at the same time, so self-fertilization is possible (Owens and Molder 1977, Crawford and Oliver 1990, Cope 1992). A population genetic study performed on Vancouver Island (Davidson and El-Kassaby 1997) found inbreeding rates ranging from zero to 27% and a highly positive correlation between outcrossing rate and mean seed size. Seed production in Pacific silver fir has been noted to be poor, with a low percentage of viable seed (ranging from 6.3 to 35%; Crawford and Oliver 1990, Cope 1992). This low reproductive output was attributed to: (1) frequent years of low pollen production; (2) a 4–6-week period of pollen dormancy after pollination, followed by a shorter time period (a week or less) for pollen germination and fertilization to take place; and (3) rapid abortion of unfertilized archegonia producing empty seeds (Owens and Molder 1977). Good seed crops are generally produced every 2–3 (–6) years (Cope 1992).

Seeds are fully mature in late August, and the seed-cones disintegrate starting in mid-September (Owens and Molder 1977, Crawford and Oliver 1990, Cope 1992). The seeds are winged but relatively heavy and are thus not dispersed far by wind. Most seeds are shed by the end of October and then generally overwinter under snow before germination the following spring. Cool, moist sites are optimal for seed germination, and seedling survival is better on mineral soil.

Seedlings are shade-tolerant but require full sunlight for maximum growth. Early mortality of seedlings is attributable to germination on snow, adverse climatic effects, and competing vegetation.

Pacific silver fir is susceptible to attack by two native species of bark beetle, the silver fir beetle (*Pseudohylesinus sericeus*) and the fir root bark beetle (*P. granulatus*), both of which are reported to occur in California (Carlson and Ragenovitch 2012). A major beetle outbreak from 1947 to 1955 killed trees on more than a million acres in Washington and Oregon. A non-native insect, the balsam woolly aphid (*Adelges piceae*), is another devastating pest of this tree, with a major outbreak occurring in 1950–1957 and heavy damage reported in low-elevation forests of Washington and British Columbia (Crawford and Oliver 1990). However, higher-elevation fir stands are relatively immune to attack by this pest. In California, fir stands on Black Mountain (Siskiyou Crest) and the Hancock Lake vicinity (Marble Mts.) are affected by the fir engraver beetle (*Scolytus ventralis*) with mortality approaching 10% on Black Mountain (Siskiyou Crest) and around 5% in the Hancock Lake vicinity (Marble Mts.) (Kauffmann 2019a, 2019b). Other insect pests noted for the Californian stands include the western spruce budworm (*Choristoneura freemani*), the Douglas-fir tussock moth (*Orygia pseudotsugata*), and possibly the balsam woolly aphid (Kauffmann 2019a, 2019b).

Pacific silver fir is extremely fire sensitive and is easily killed by fires; this is because of its thin bark that provides little insulation for the cambium, shallow roots that are susceptible to soil heating, and highly flammable foliage (Cope 1992). In 2017, the Abney Fire caused 50–100% mortality in the upper part of the Joe Creek stand along the Siskiyou Crest (Kauffmann 2019a). Also in 2017, the Wallow Fire caused fir mortality approaching 100% in areas around Toms Lake and Upper Hancock Lake (Kauffmann 2019b). Fire frequency is reportedly a limiting factor in the range of Pacific silver fir, and it is slow to reoccupy areas of suitable habitat following fire or other disturbance (Cope 1992). As a result, it may not regain importance amongst the larger trees for 700 to 800 years.

Overview of ecological conditions for recovery, conservation, and viability³ including Threats and Risk Factors

Pacific silver fir is a common and widespread forest tree in the Pacific Northwest, but in northern California it is rare and limited to two, or possibly three, isolated areas in western Siskiyou County, all on National Forest lands: (1) along the crest of the Siskiyou Mountains east of Cook and Green Pass (5 occurrences); (2) in the Marble Mountains near Hancock Lake (three occurrences plus two newly documented locations); and (3) a poorly known and possibly misidentified occurrence near Deep Lake in the northern part of the Marble Mountains. All nine occurrences in the CNDDb (2020) have a site quality rank of “unknown,” and the recently published accounts by Kauffmann (2019a, 2019b) represent the best available data on the Californian stands, which are reported to occupy a total area of 10.3 hectares (25 acres).

³ 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.

Pacific silver fir is a commercially important timber tree in the U.S. However, the stands of this species in California are relatively small, and those on the Klamath National Forest are set aside within the Marble Mountain Wilderness. The occurrences located along the Siskiyou Crest (Rogue River-Siskiyou National Forest) are not in designated wilderness but are being managed for recreational (non-timber) use owing to their proximity to the Pacific Crest Trail; the forests in this area also do not have a good timber base, meaning the local volume of timber is not currently marketable (C. Emerson 2021, pers. comm.).

Fire and climate change are seemingly the most important threats to Pacific silver fir in California. Species like Pacific silver fir that occur at or near their southern distributional limits are expected to be most vulnerable to climatic warming and drying (Cahill et al. 2014). Climatic effects are further expected to increase the frequency and severity of wildfires in northern California (Fried et al. 2004, Jones et al. 2020, Smith et al. 2020), with potentially catastrophic effects on fire-sensitive species like Pacific silver fir. Prolonged regional drought might also place forest trees like Pacific silver fir under physiological stress, making them more susceptible to attack and increased mortality by wood-boring insects or fungal pathogens (DeSiervo et al. 2018, and refs. cited therein).

Taxonomy⁴

Table 3 summarizes this species or subspecies/variety's name status in key literature.

Table 3. Name status of Pacific silver fir	
Entity	Name Status
CNDDDB and CNPS	<i>Abies amabilis</i> (Dougl.) Forbes
<i>Jepson eFlora</i>	<i>Abies amabilis</i> Douglas ex J. Forbes
<i>Jepson Manual</i> (1993)	<i>Abies amabilis</i> (Douglas) J. Forbes
<i>Flora of North America</i>	<i>Abies amabilis</i> Douglas ex J. Forbes
USDA NRCS ^a PLANTS	<i>Abies amabilis</i> (Douglas ex Loudon) Douglas ex Forbes
^a Natural Resources Conservation Service [NRCS]	

Synonymy: *Picea amabilis* Douglas ex Loudon (Farjon 1998, TROPICOS 2020).

Jepson eFlora link: https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=11520

Type locality: The original description of *Picea amabilis* Douglas ex Loudon (1838) does not indicate the collecting locality, only that “[t]he cones were sent home [to Britain] by [David] Douglas in 1831, without any further information than the name.” The first description of *Abies amabilis* (Forbes 1839) does not cite any collections and states only that the material under cultivation at the Woburn Abbey (Bedfordshire, England) was “one of the discoveries of Mr. Douglas, who transmitted the cones from North America to the Horticultural Gardens in 1831.” According to *TL-2*, some of Forbes’ type specimens are kept in the herbarium of RBG Kew in west London, and there is a specimen in that herbarium collected by *D. Douglas s.n.* in anno 1825 (barcode K000567698), with the location given as “Mountains of the Grand Rapids of the Columbia [River] and the high mountains near the confluence of that stream.” The work of

⁴ 1909.12, Chapter 10, Section 12.53, component 1.

Farjon (1993) should be consulted to determine if the Kew sheet is the lectotype or whether a different specimen has been designated as such. A fragmentary specimen in the herbarium of the Missouri Botanical Garden, St. Louis, is labeled “Herb. Kew, Sept. 1869” with the location given as “[a]bundant on Mountains at the rapids of the Columbia” (barcode MO-098616); this sheet was annotated in 1975 by conifer authority Elbert L. Little, Jr., as “perhaps fragment of type collection” (TROPICOS 2020).

Key literature

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Persons Contacted

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- Kauffmann, Michael. 2020. Conifer expert and author based in Humboldt County, CA. Email correspondence regarding distribution and abundance of Pacific silver fir (*Abies amabilis*) in California. Personal communications 29 September and 05 October 2020.

Author(s) and Date:

R. Douglas Stone, California Native Plant Society, Associate Rare Plant Botanist, 22 July 2021; finalized 01 November 2021

Reviewer(s) and Date:

Aaron E. Sims, California Native Plant Society, Rare Plant Program Director, 27 September 2021; Julie Ann Kierstead, USDA Forest Service Region 5, Ecosystem Planning, 07 October 2021

Formatting: Form is set up as 508 compliant. Please use the “styles” if further formatting is necessary.

Purpose: This is to maintain the best available science on a species that could be used by the Forest Service in a variety of functions. Specifically, there would be additional steps and evaluations to determine whether or not this species would be considered a Species of Conservation Concern under the 2012 Planning Rule or a Sensitive Species under the 1982 Planning Rule.

Appendix 1: Known Occurrences

Table 4. Known occurrences of Pacific silver fir within California (NRIS, CNDDDB, Calflora/CCH databases).

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in red.									
Rec. #	Locality	County	Quad	Ref. (Source)	Date Last Obs'd	Population Info	Threats	Land Mgr.	Elev. (ft.)
1	PINE LAKE, MARBLE MOUNTAINS, KLAMATH NATIONAL FOREST.	Siskiyou	English Peak (4112342)	CNDDDB, September 2020 (EO 1)	22-Aug-1972	ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1972 COLLECTION BY CLIFTON.		Klamath NF, State lands	6320
2	BIG HANCOCK LAKE, MARBLE MOUNTAINS, KLAMATH NATIONAL FOREST.	Siskiyou	English Peak (4112342)	CNDDDB, September 2020 (EO 2)	15-Sep-1958	THREE COLLECTIONS FROM THIS VICINITY: FERRIS AND KILDALE (#6554 DS) IN 1928, ROOF (SN UC) IN 1948, AND SMITH (#2195 SJSU) IN 1958.		Klamath NF	7000
3	DIAMOND LAKE, MARBLE MOUNTAINS, KLAMATH NATIONAL FOREST.	Siskiyou	English Peak (4112342)	CNDDDB, September 2020 (EO 3)	17-Jul-1973	THREE COLLECTIONS FROM THIS VICINITY: OETTINGER (#711 HSC) IN 1968, SAWYER (#525 HSC) IN 1968, AND LESTER (#52 HSC) IN 1973.		Klamath NF	6800
4	DEEP LAKE, RED MOUNTAIN, KLAMATH NATIONAL FOREST.	Siskiyou	Boulder Peak (4112351)	CNDDDB, September 2020 (EO 4)	5-Aug-1969	ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1969 COLLECTION BY MUTH.		Klamath NF	6700

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in red.									
Rec. #	Locality	County	Quad	Ref. (Source)	Date Last Obs'd	Population Info	Threats	Land Mgr.	Elev. (ft.)
5	NORTH SLOPE BLACK MOUNTAIN, ROGUE RIVER NATIONAL FOREST.	Siskiyou	Dutch Creek (4112381)	CNDDDB, September 2020 (EO 5)	21-Jun-1988	LARGE STAND FIRST DISCOVERED BY E. PARKER. MAPPING IS AN ESTIMATE PROVIDED BY S. LANGER.		Rogue River-Siskiyou NF	6000
6	ABOUT 0.7 MILE WSW OF BLACK MOUNTAIN SUMMIT, NEAR SLAUGHTERHO USE FLAT, ROGUE RIVER NATIONAL FOREST.	Siskiyou	Dutch Creek (4112381)	CNDDDB, September 2020 (EO 6)	21-Jun-1988	MAPPING IS AN ESTIMATE PROVIDED BY S. LANGER.		Rogue River-Siskiyou NF	6200
7	ABOUT MIDWAY BETWEEN BLACK MOUNTAIN AND COPPER BUTTE ALONG THE PACIFIC CREST TRAIL, ROGUE RIVER NATIONAL FOREST.	Siskiyou	Dutch Creek (4112381)	CNDDDB, September 2020 (EO 7)	21-Jun-1988	MAPPING IS AN ESTIMATE PROVIDED BY S. LANGER.		Rogue River-Siskiyou NF	5900

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in red.									
Rec. #	Locality	County	Quad	Ref. (Source)	Date Last Obs'd	Population Info	Threats	Land Mgr.	Elev. (ft.)
8	BETWEEN BLACK MOUNTAIN & COPPER BUTTE NEAR COOK & GREEN CREEK & JOE CREEK DIVIDE, ROGUE RIVER NATIONAL FOREST.	Siskiyou	Dutch Creek (4112381)	CNDDDB, September 2020 (EO 8)	21-Jun-1988	MAPPING IS AN ESTIMATE PROVIDED BY S. LANGER.		Rogue River-Siskiyou NF	6000
8	200' N of PCT, ca 2.5 mi E of ... -- Cook & Green Pass, Siskiyou NF	Siskiyou	Dutch Creek (4112381)	Calflora, September 2020 (wb1194-0)	12-Aug-2011	1+ individuals		Rogue River-Siskiyou NF	5930
9	BELOW SUMMIT OF COPPER BUTTE, ROGUE RIVER NATIONAL FOREST.	Siskiyou	Dutch Creek (4112381)	CNDDDB, September 2020 (EO 9)	3-Oct-1961	ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1961 COLLECTION BY PARKER. HEIGHT ABOUT 90 FEET, DBH 20 INCHES IN A YOUNG MATURE TREE.		Rogue River-Siskiyou NF	6300
10	[near Upper English Lake] Silver fir - mountain hemlock - Shasta fir forest	Siskiyou	English Peak (4112342)	Calflora, September 2020 (gp18608)	3-Sep-2019	101–1000 individuals		Klamath NF	
11	[NW-facing slope above Toms Lake] mountain hemlock - silver fir forest	Siskiyou	English Peak (4112342)	Calflora, September 2020 (gp18609)	4-Sep-2019	101–1000 individuals		Klamath NF	

Appendix 2: Additional Considerations at the Forest Level

<This section, including the next 5 subheadings, would be filled out by **Forest Service botanists.**>

<Forest Name>

Geographic distribution within the Forest

- A. Scarce or isolated
- B. Patchy or gaps
- C. Contiguous

<Select a geographic distribution rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Abundance of the species on the Forest

- A. Rare – current abundance is low enough that stochastic and other factors could lead to potential imperilment.
- B. Uncommon – current abundance is large enough that demographic stochasticity is not likely to lead to rapid local extinction, but, in combination with highly variable environmental factors, could pose a threat.
- C. Common – current abundance is large enough that species persistence is not threatened by demographic stochasticity in combination with environmental variation.
- D. Insufficient information to draw inferences about criterion.

<Select a species abundance rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Population trend on the Forest

- A. Significant downward or suspected downward population trend.
- B. Stable population.
- C. Upward population trend.
- D. Insufficient information to draw inferences about criterion.

<Select a population trend rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Habitat trend on the Forest

- A. Decline in habitat quality or quantity.
- B. Stable amounts of suitable or potential habitat, relatively unchanged habitat quality.
- C. Improving habitat quality or increasing amounts of suitable or potential habitat.
- D. Insufficient information to draw inferences about criterion.

<Select a habitat trend rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Vulnerability of habitat on the Forest

- A. Substantial modification of habitat has occurred or is anticipated with conditions departing from expectations based on NRV, and/or habitat is impacted by modern stressors such as drought, climate change, high intensity wildfire and wildfire suppression disturbances, loss of natural openings due to historical wildfire suppression, nonnative invasive species, water impoundments and diversions, and recreation, etc.
- B. Habitat modification is likely to result in ecological patterns similar to the range of historical conditions, but is being impacted by modern stressors.
- C. Habitat resilient, changes are similar in frequency and intensity to those expected from NRV, and modern stressors not significant.
- D. Insufficient information to draw inferences about criterion.

<Select a habitat vulnerability rank and provide references or cite 'specialist expertise, <name>' where appropriate.>

Additional Forest specific information related to the SCC determination

<This section is provided for Forest botanists to add additional Forest specific information that is not captured in the section above, if necessary. Provide a narrative description here of the additional relevant information. State "No additional information" if this section is not used.>