

## Plant Species Evaluation Form

### *Lupinus tracyi* Eastw.

#### TRACY'S LUPINE

**Family:** Fabaceae  
(CNPS 2018)

**PLANTS Symbol:** LUTR  
(USDA 2018)

**Calif. Endemic:** No  
(CNPS 2018)

**Synonyms/Other Names:** Described in 1940 by Alice Eastwood. No additional names or synonyms have been used to refer to this taxon (Tropicos 2018).

**Identification Issues:** Considerable identification issues are unknown. *Lupinus tracyi* is distinguished by its herbaceous perennial habit (lacking wood at base), glabrous banner back, glabrous keel, its slender upright stems, and cauline leaves (Sholars and Riggins 2018). The original description by Alice Eastwood suggests that *L. tracyi* may be a member of the *L. albicaulis* group. *Lupinus tracyi* is distinguished from *L. albicaulis* by its smooth, glabrous, and glaucous foliage (Eastwood 1940). Recently (2020), *Flora of North America* and *Jepson eFlora* *Lupinus* author Teresa Sholars annotated Trinity County specimens of *L. tracyi*, west of Trinity Lake, north of Weaverville, as *L. albicaulis*.

#### **Taxonomy:**

Unless otherwise cited, the following description is used with permission from the Jepson Herbarium. Jepson Flora Project (eds.) 2018. *Jepson eFlora*, <http://ucjeps.berkeley.edu/eflora/>, accessed in 2018. Copyright © Regents of the University of California.

Species In Genus: +- 220 species: especially western North America, western South America to eastern United States, also tropical South America, Mediterranean to western Asia, eastern tropical Africa; some cultivated for fodder, green manure, edible seed, ornamental. Etymology: (Latin: wolf, from mistaken idea that plants rob soil of nutrients) Toxicity: Some (e.g. *Lupinus arboreus*, *Lupinus latifolius*, *Lupinus leucophyllus*) have alkaloids (especially in seeds, fruits, young herbage). TOXIC to livestock (especially sheep). Note: Inflorescence length excludes peduncle; some California species naturalized in eastern North America, South America, Australia, southern Africa.

Genus Description – Habit: Annual to shrub; cotyledons generally petioled, withering early. Stem: generally erect. Leaf: palmately compound [or not], generally cauline; stipules fused to petiole; leaflets 3--17, generally oblanceolate, entire. Inflorescence: raceme, flowers spiraled or whorled, occasionally also in lower leaf axils; bracts generally deciduous. Flower: calyx 2-lipped, lobes entire or toothed, generally appendaged between; corolla blue, purple, white, or yellow, banner glabrous to densely hairy, centrally grooved, sides reflexed, wing tips +- fused, keel generally beaked; stamens 10, filaments fused, 5 long with short anthers, 5 short with long anthers; style brush-like. Fruit: dehiscent, generally oblong. Seed: 2--12, generally smooth.

Species Description – Habit: Perennial herb 4--7 dm, glabrous, glaucous. Stem: erect, slender. Leaf: cauline; stipules 7--9 mm; petiole < 1 cm; leaflets 6--7, 10--40 mm. Inflorescence: 4--16 cm, flowers +- whorled or not; peduncle 2--6 cm; pedicels 5--6 mm; bract 8--10 mm. Flower: 8--10(12) mm; calyx upper lip 3--8 mm, 2-toothed, lower 3--5 mm, 3-toothed; petals +- white to

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dull blue, banner back glabrous, keel glabrous. Fruit: 1.5--2.5 cm, white-hairy, dark when dry. Seed: 3--4, 4--5 mm. eFlora Treatment Author: Teresa Sholars & Rhonda Riggins.

**Status:**

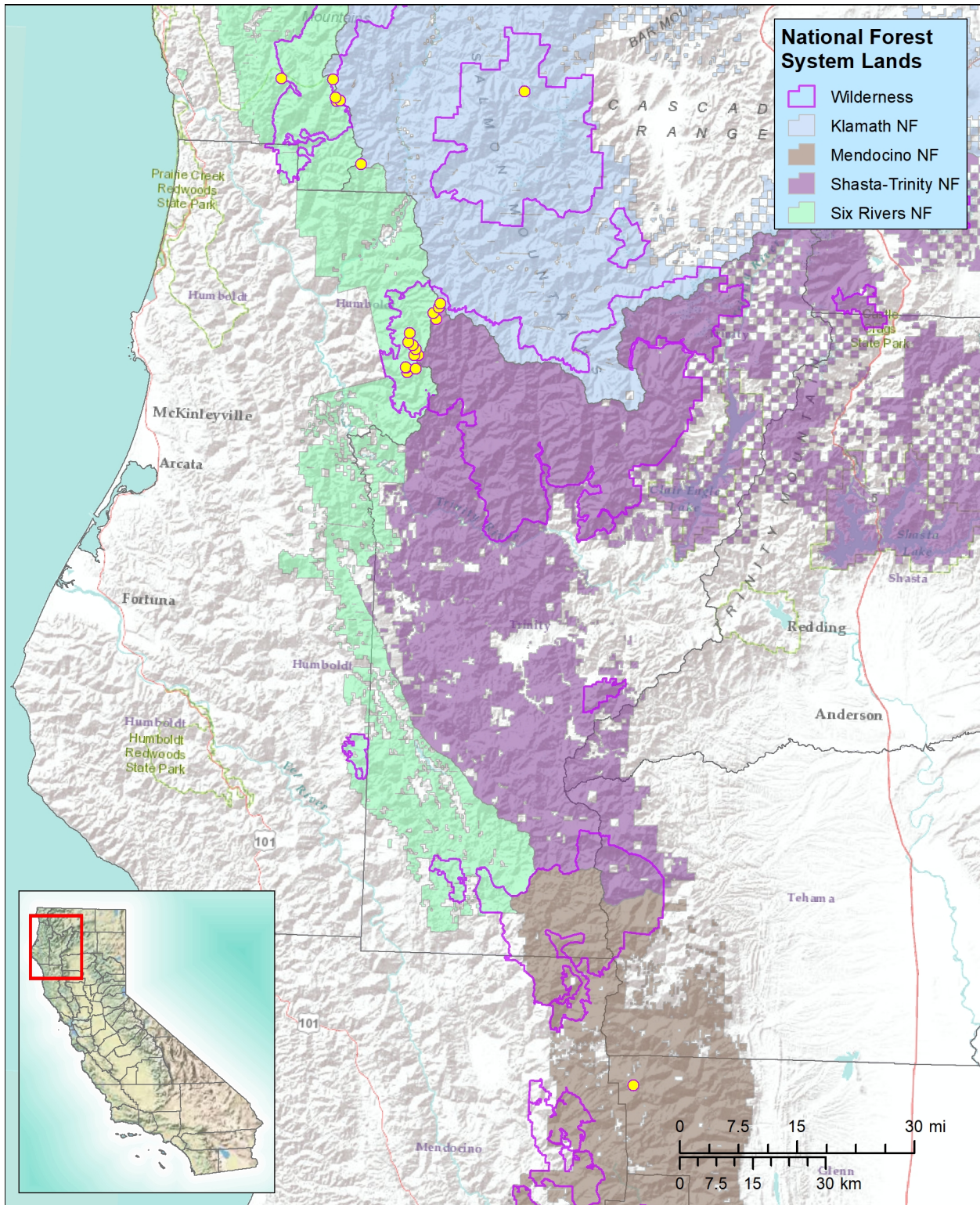
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G4	CA: S3 NV: Not listed OR: S2	4.3	Not listed	Not listed	Not listed
SWAP: Not listed	NNHP: Not listed	NNPS: Not listed	ORBIC: 2: Threatened, Endangered or Extirpated from Oregon, but Secure or Abundant Elsewhere		OCS: Not listed	IUCN: Not listed

Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2018b), Nevada Division of Forestry Fully Protected Plant Species (NAC 527) (NDF 2012), Oregon Department of Agriculture Listed Plants (ODA 2014); G-rank=Global Conservation Status (CDFW 2018a; NatureServe 2018); S-rank=Subnational (state or province-level) Conservation Status (CDFW 2018a; NatureServe 2018; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2018); R5 FSS=USDA Forest Service Region 5 Regional Forester Sensitive Plant Species List (USDA 2013); NFP SM=Forest Service and Bureau of Land Management Northwest Forest Plan Survey and Manage Species (USDA 2001); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); SWAP=California State Wildlife Action Plan Status (CDFW 2015); NNHP=Nevada Natural Heritage Program Status (NNHP 2017); NNPS=Nevada Native Plant Society Status (NNHP 2017); ORBIC=Oregon Biological Information Center Status (ORBIC 2016); OCS=Oregon Conservation Strategy Species (ODFW 2016); IUCN=International Union for Conservation of Nature Red List Status (IUCN 2017).

**Distribution:** Western North America; occurrences are restricted to northern California and southwestern Oregon. California occurrences are found in Del Norte, Siskiyou, Humboldt, and Trinity counties, and entirely within the Klamath Ranges (KR) bioregion (CCH 2017; Sholars and Riggins 2018). All 22 records are associated with National Forest System lands. Half (11/22; 50%) of all California occurrences are found on Six Rivers NF. Just under one-fifth (4/22; ~18%) of California occurrences are on Shasta-Trinity NF. The Klamath NF supports six occurrences (6/22; 27%), and Mendocino NF supports just one (1/22; ~5%) (CCH 2017).

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**Sources:** *Distribution:* CCH 2017. *Layers:* USDA Forest Service, Pacific Southwest National Forests: CPAD 2016. *California counties:* CDF 2009. *Basemaps:* California inset map: © 2013 National Geographic Society, i-cubed (Esri 2017a). Main map: Esri, DeLorme, USGS, NPS (Esri 2012) and Esri, USGS, NOAA (Esri 2017b).

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**Locations within California:**

Record numbers indicate sites that contain an individual, population, or groups of populations located within ¼ mile of each other, per the California Natural Diversity Database (CNDDDB 2017) definition of Element Occurrences (EOs) in California. Official EO numbers for plants in California are determined solely by the CNDDDB and are included within the Reference (Source) column for CNDDDB data. Duplicate records from the same site are given the same record number and included in red. The Population Info column includes total number of individuals and total number and size of populations/sub-populations when provided. Elevations provided in meters from source have been converted to feet. If not provided in original source, Land Manager information was obtained using the California Protected Areas Database (CPAD 2016) and Quad information was obtained using 24K Quads, SDE Feature Class (CDFG 2013). All other information is directly from the Reference (Source) unless additional citation is given.

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
1	Black Butte River Watershed. S aspect, S of Pinto Riddge ridgetop road	Glenn	Plaskett Ridge (3912268)	CCH, Jan 2017 (CHSC111697)	10-Aug-1987			Mendocino NF	6800
2	near Bret Hole	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC1488744)	19-Jul-1980			Six Rivers NF	347
3	Near Bret Hole	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC66275)	19-Jul-1980			Six Rivers NF	348
3	Corral Prairie, Trinity Summit	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (RSA104397)	15-Jul-1932			Six Rivers NF	0
4	on ridges east on Corral Prairie, Trinity Summit	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (SEINET3069359)	15-Jul-1932			Six Rivers NF	0
5		Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC76513)	5-Aug-1981			Six Rivers NF	6001
5	ridges e Corral Prairie; Klamath Mountains; ridges E of Corral Prairie, Trinity Summit, Klamath Mts., Humboldt Co.	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC502994)	15-Jul-1932			Six Rivers NF	6000

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Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
5	ridges e Corral Prairie; Klamath Mountains, Trinity Summit; Trinity summit, Humboldt Co.	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC502995)	15-Jul-1932			Six Rivers NF	6000
5	ridges e Corral Prairie (Trinity Summit); Klamath Mountains, e of Corral Prairie	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC502996)	15-Jul-1932			Six Rivers NF	6000
6	N of Trinity Summit Station, E of trail	Trinity	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC59453)	27-Jun-1979			Shasta-Trinity NF	6001
7	Along trail to Trinity Summit Station, 50' S of intersection of Grogan hole-Devils backbone trail	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC59452)	27-Jun-1979			Six Rivers NF	5801
7	Near Trinity Summit Guard Station, close to Hoopa	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC57931)	31-Jul-1979			Six Rivers NF	6181
7	Along Jeep Rd. 6E08 just SE of Waterdog Lake	Trinity	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC81696)	11-Jul-1979			Six Rivers NF	5801
7	along trail from Devil's Hole to Grogon's Hole vic. Trinity Summit Guard Station; Salmon Mtn. Quad., Vic. Trinity Summit Guard Station	Trinity	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC1446109)	27-Jul-1979			Six Rivers NF	6300
7	Six Rivers National Forest Along a ridge near (NE of) Trinity Summit Station, Trinity Co. line	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (UCR40070)	27-Jun-1979			Six Rivers NF	6001
8	Along ridge trail SE of N Trinity Mtn.	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC46925)	3-Aug-1973			Shasta-Trinity NF	6001

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Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
8	Along trail to N Trinity Mtn. just N of junction with trail out Devil's Backbone.	Trinity	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC82391)	11-Jul-1979			Six Rivers NF	5902
8	junc trails to Grogan Hole, Trinity Summit Station N Trinity Mtn.; Salmon Mtn Quad.	Trinity	Trinity Mtn. (4112314)	CCH, Jan 2017 (UC1446110)	24-Jul-1979			Six Rivers NF	5900
9	Near Tish Tang A Tang Creek.	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC76441)	12-Aug-1981			Six Rivers NF	5840
10	Near N Trinity Mtn., close to the town of Hoopa	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC57899)	31-Jul-1979			Six Rivers NF	6365
10	Near N Trinity Mtn., close to the town of Hoopa	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC58118)	1-Aug-1979			Six Rivers NF	5902
11	Near Horse Trail Ridge, close to the town of Hoopa	Humboldt	Trinity Mtn. (4112314)	CCH, Jan 2017 (HSC58042)	1-Aug-1979			Six Rivers NF	6158
12	Salmon Mountain; Salmon Mt. Quad., near Salmon Mountain	Humboldt	Salmon Mtn. (4112324)	CCH, Jan 2017 (UC1488739)	22-Jul-1980			Shasta-Trinity NF	944
13	Near Salmon Mtn.	Humboldt	Salmon Mtn. (4112324)	CCH, Jan 2017 (HSC66274)	22-Jul-1980			Shasta-Trinity NF	5971
14	Near Red Cap Lake, close to the town of Forks of Salmon.	Humboldt	Salmon Mtn. (4112324)	CCH, Jan 2017 (HSC58602)	25-Jul-1979			Six Rivers NF	5853
15	Near Salmon Mtn., close to the town of Forks of Salmon	Humboldt	Salmon Mtn. (4112324)	CCH, Jan 2017 (HSC58361)	26-Jul-1979			Klamath NF	6752
15	Near Salmon Mtn., close to the town of Forks of Salmon	Humboldt	Salmon Mtn. (4112324)	CCH, Jan 2017 (HSC58566)	26-Jul-1979			Six Rivers NF	6499

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Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
16	3.5 miles from the north end of road 12N06 along the road surface	Siskiyou	Bark Shanty Gulch (4112345)	CCH, Jan 2017 (CHSC31370)	26-Sep-1980			Klamath NF	4350
17	SE edge of Flint Valley.	Siskiyou	Chimney Rock (4112356)	CCH, Jan 2017 (HSC66255)	26-Jun-1980			Klamath NF	4560
18	se edge Flint Valley; Klamath National Forest, Dillon Mtn. Quad., Flint Valley	Siskiyou	Chimney Rock (4112356)	CCH, Jan 2017 (UC1483487)	26-Jun-1980			Klamath NF	4560
19	Near Flint Valley, close to Orleans	Siskiyou	Chimney Rock (4112356)	CCH, Jan 2017 (HSC49940)	13-Jul-1978			Klamath NF	4652
20	about 4 mi se of Elk Valley (in Flint Valley); Flint Valley	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (JEPS30463)	20-Jul-1950			Klamath NF	4700
20	about 4 mi se of Elk Valley (Del Norte County) in Flint Valley	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (UC1223256)	20-Jul-1950			Klamath NF	4700
21	Near Summit Valley Trail, close to the town of Klamath	Del Norte	Summit Valley (4112357)	CCH, Jan 2017 (HSC53646)	26-Jun-1979			Six Rivers NF	4649
22	Elk Valley. NE section of Valley.	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (HSC59243)	17-Aug-1979			Six Rivers NF	5502

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**Distribution on National Forest System (NFS) Lands:**

(Please see Reference column of Locations table above for references pertaining to Record Numbers indicated on NFS lands.)

National Forest System (NFS) lands	Record #s (from Locations table above)	CNDDDB EOs	Non-CNDDDB Records	Recent (seen in past 20 yrs.)	Historic (not seen in past 20 yrs.)	Most Recent Obs.	EOs/ Recs. (5 mile buffer)	Total Records on NFS lands
Angeles:	-	-	-	-	-	-	-	0
Cleveland:	-	-	-	-	-	-	-	0
Eldorado:	-	-	-	-	-	-	-	0
Inyo:	-	-	-	-	-	-	-	0
Klamath:	15, 16, 17,18,19, 20,	-	6	-	6	26-Sep-1980	1	6
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	1	-	1	-	1	10-Aug-1987		1
Modoc:	-	-	-	-	-	-	-	0
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	6,8,12,13	-	4	0	4	22-Jul-1980	9	4
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	2,3,4,57, 9,10, 11,14,21, 22	-	11	-	11	19-Jul-1980	4	11
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
<b>Totals:</b>	N/A	0	22	0	22	N/A	14	22

**Demographic and Population Trends:** Total number of occurrences for this taxon were estimated using GIS tools and methods described by Green and Sims (2018). A majority (22/24; ~92%) of occurrence records are historic and have not been documented in over 20 years. Demographic and population trends are lacking for *L. tracyi*. Further documentation and fieldwork is needed.



**Life History:** *Lupinus tracyi* is a perennial herb that begins to flower as early as May, but typically blooms from June through July (CNPS 2017). *Lupinus* is a nitrogen fixing legume that develops root nodules that house diazotrophic bacteria in the genera *Bradyrhizobium* and *Rhizobium* (Barrera et al. 1997). These microbes are able to fix atmospheric nitrogen into bioavailable ammonia, which the host plant incorporates into developing tissue. Nitrogen fixation in legumes also enriches soil fertility around the host plant through the decomposition of aged roots and nodules (Ledgard and Steele 1992). Certain members of *Lupinus* are known to be toxic to livestock (Keeler and Panter 1989). Within-species variation in response to seed vernalisation is known for plants in the genus *Lupinus*. Seed production is often greater among perennial lupines. Physical dormancy of seeds via hardened seed coats that are often impermeable to water or gases is common in Fabaceae. Permeability of seed coats increases with greater moisture content (*L. digitatus* seed coat fully permeable above 14% moisture). Seeds are entirely impermeable when moisture is very low (below 11% in *L. digitatus*).

Plants in the genus *Lupinus* are known to produce sticky pollen that is not conducive to wind dispersal (OGTR 2013). Members of *Lupinus* are visited by an assortment of insect pollinators, including anthophorine bees (*Anthophora* spp.), bumble bees (*Bombus* spp.), carpenter bees (*Xylocopa* spp.), honey bees (*Apis* spp.), leaf-cutting bees (*Anthidium*, *Anthidiellum*, *Megachile*, *Osmia*, and *Protosmia* spp.), long-horned bees (*Eucera* spp.), beetles (Coleoptera), blues butterflies (*Echinargus* and *Plebejus* spp.), brush-footed butterflies (*Vanessa*, *Junonia*, *Phyciodes*, and *Limenitis* spp.), hairstreak butterflies (*Satyrium* spp.), skipper butterflies (*Pholisora*, *Polites*, *Hesperia*, *Oarisma*, *Paratrytone*, *Erynnis*, *Epargyreus*, and *Euphyes* spp.), sulphur butterflies (*Colias* spp.), swallowtail butterflies (*Papilio* spp.), root-maggot flies (*Delia* spp.), and syrphid flies (*Eristalis* spp.) (CPC 2018). An extended discussion on the biology of plants in the genus *Lupinus* is found in the included document from the Australian Office of the Gene Technology Regulator (OGTR 2013).

**Diversity:** *Lupinus* is a prominent member of Faboideae. This subfamily is represented by upward of 500 genera and approximately 14,000 species with zygomorphic flowers that have a prominent banner sitting outside the lateral wings, have dry and elongate fruit that dehisce along two edges, and nodule forming roots that house diazotrophic microbes (Stevens 2001). *Lupinus* is a group of roughly 250 species in the Genisteae (Drummond 2008; Stevens 2001). The Genisteae is a tribe of roughly 25 northern temperate genera. Plants commonly referred to as “brooms” or “gorse” in the genera *Cytisus*, *Genista*, and *Ulex* are also members of this tribe alongside *Lupinus* (Stevens 2001). Roughly 12 species of *Lupinus* are found in Mediterranean Europe. Eastern South America is home to roughly 24 species, whereas eight are found in eastern North America. A bulk of the diversity is represented by taxa in the highlands of Mexico and Central America (~30 species), the Andes of western South America (~85 species), and western North America in the Rockies, Great Basin, and along the Pacific slope (~88 species).

Studies on molecular divergence times of taxa in Fabaceae demonstrate that *Lupinus* and *Spartium* split nearly 16.0 Mya. Data based on cpDNA suggest that *Lupinus* arose 5.8-10.0 Mya, long after the breakup of Gondwanaland (~100 Mya) and the breakdown of the North Atlantic land bridge (~50 Mya). This suggests amphi-Atlantic distributions are best explained by long-

distance dispersal. Mapping of ancestral biogeography places the origin of *Lupinus* in the Old World, indicating later migration into the New World and subsequent radiation among the species-rich western New World clade (200 of the roughly 250 species in *Lupinus*). Andean-Mexican perennials and western North American perennials occupy a single clade among the western New World taxa, where each regional subclade underwent respective radiations 0.8-3.4 Mya and 0.7-2.1 Mya. Speciation rates among both Andean-Mexican and Western North American subclades are substantially higher than what is measured elsewhere. The positive correlation between perennials and high elevation habitat suggests that speciation in these perennial groups is linked to habitat formation as a result of uplift of the Andes (2-4 Mya) and the mountain ranges of the Pacific Slope (2-5 Mya) (Drummond 2008).

**Habitat:** *Lupinus tracyi* occurrences are associated with upper montane coniferous forests of Del Norte, Siskiyou, Humboldt, and Trinity counties (CNPS 2018). Plants are known to occupy dry habitat within open montane forests (Sholars and Riggins 2018).

**Habitat Status or Trend:** Fire suppression impacts the open forest habitat preferred by *L. tracyi*. Forest openings behave as microsites for species intolerant of shade. Significant changes to the size and spatial characteristics of openings within forests of the Klamath Mountains of California have taken place during the last one-hundred years (Skinner 1995).

**Capacity for the Species to Disperse:** Members of the genus *Lupinus* produce dense seeds without appendages that are not conducive to wind dispersal over long distances. Waterways, animals, and human activities may foster long distance dispersal in some cases. A feeding study demonstrated a low rate of *L. arboreus* seed survival after ingestion by deer. Most lupines exhibit mechanical dispersal and are commonly dispersed one to several meters from parent plants each year (OTGR 2013).

**Threats:** Direct threats to this taxon remain unreported (CNPS 2018; NatureServe 2018).

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Aaron E. Sims, Rare Plant Botanist, California Native Plant Society, (916) 324-3816, asims@cnps.org. June 28, 2018.

Molly S. Wiebush, Rare Plant Botanist Coordinator, California Native Plant Society. 02 February 2022.

**Reviewer(s) and Date:**

David Magney, Rare Plant Program Manager, California Native Plant Society, (916) 447-2677 ext. 205, dmagney@cnps.org. June 28, 2018.

Julie Ann Kierstead, USDA Forest Service Region 5 Ecosystem Planning, 10 January 2022.

**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.

**Additional Considerations at the Forest Level:** Habitat amount and juxtaposition of both the species and habitat locations.