Plant Species Evaluation Form

Saxifraga cespitosa L.

TUFTED SAXIFRAGE

Family: Saxifragaceae (CNPS 2017) | **PLANTS Symbol:** SACA50 (USDA 2017) | **Calif. Endemic:** No (CNPS 2017)

Synonyms/Other Names: Carl Linnaeus described *Saxifraga cespitosa* in 1753, assigning it the name that is currently in use today (Tropicos 2017). This taxon displays considerable variation and is globally distributed at northerly latitudes. As a result, the following names have been applied to this taxon at one point in time: *Muscaria delicatula* Small, *M. micropetala* Small, *M. monticola* Small, *Saxifraga cespitosa* subsp. *decipiens* (Ehrhart) Engler & Irmscher, *S. cespitosa* var. *emarginata* (Small) Rosendahl, *S. cespitosa* subsp. *exaratoides* (Simmons) Engler & Irmscher, *S. cespitosa* subsp. *laxiuscula* (Engler & Irmscher) Á. Löve & D. Löve, *S. cespitosa* var. *lemmonii* Engler & Irmscher, *S. cespitosa* var. *minima* Blankenship, *S. cespitosa* subsp. *monticola* (Small) A. E. Porsild, *S. cespitosa* subsp. *sileneflora* (Sternberg ex Chamisso) Hultén, *S. cespitosa* subsp. *subgemmifera* Engler & Irmscher, *S. cespitosa* var. *subgemmifera* (Engler & Irmscher) C. L. Hitchcock, and *S. cespitosa* subsp. *uniflora* (R. Brown) A. E. Porsild (Brouillet and Elvander 2009).

Identification Issues: Noteworthy identification issues are lacking. There are three species of *Saxifraga* in California. *Saxifraga cespitosa* is distinguished from the two other California species by the presence of linear-lobed cauline leaves that are distributed along a trailing stem. The two remaining species of *Saxifraga* have predominately basal leaves with lobes that are not linear. It is possible that members of *Micranthes* may be confused with members of *Saxifraga*. *Micranthes* taxa have leaves that lack conspicuous lobes (Park 2017).

Taxonomy:

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Species In Genus: +- 300 species: cool northern temperate, boreal, arctic. Etymology: (Latin: rock-breaking) Note: *Saxifraga stolonifera* W. Curtis cultivated only. Other taxa in TJM (1993) moved to *Cascadia*, *Micranthes*.

Genus Description Habit: Plant generally +- hairy, often glandular; caudex or rhizome generally not woody, generally scaly. Leaf: blade obovate to round, base tapered to reniform or cordate, margin lobed. Inflorescence: raceme or panicle; flowers 1--many; bracts scale-like. Flower: hypanthium free or +- fused to ovary; [petals sometimes spotted]; stamens 10, filaments generally flat; pistil 1, ovary superior to +- inferior (sometimes more superior in fruit), chambers 2, placentas 2, axile, styles 2, free throughout. Fruit: capsule.

Species Description Habit: Plant glandular; caudex slender, +- woody; bulblets 0. Stem: short, +- trailing, +- woody. Leaf: cauline, generally crowded, 5--10 mm, sessile; blade obovate; lobes 3--5 at tip, +- linear. Inflorescence: raceme 2--5 cm; peduncle long, generally with 1 leaf-like bract

near middle, generally 1--2 flowers at tip. Flower: sepals erect to spreading, << petals, elliptic; petals 3--5 mm, elliptic to obovate, ephemeral; filaments slightly widened toward base; nectaries inconspicuous or 0; ovary inferior in flower. Chromosomes: 2n=52,56,60,63,65,80. eFlora Treatment Author: Michael S. Park.

Status:

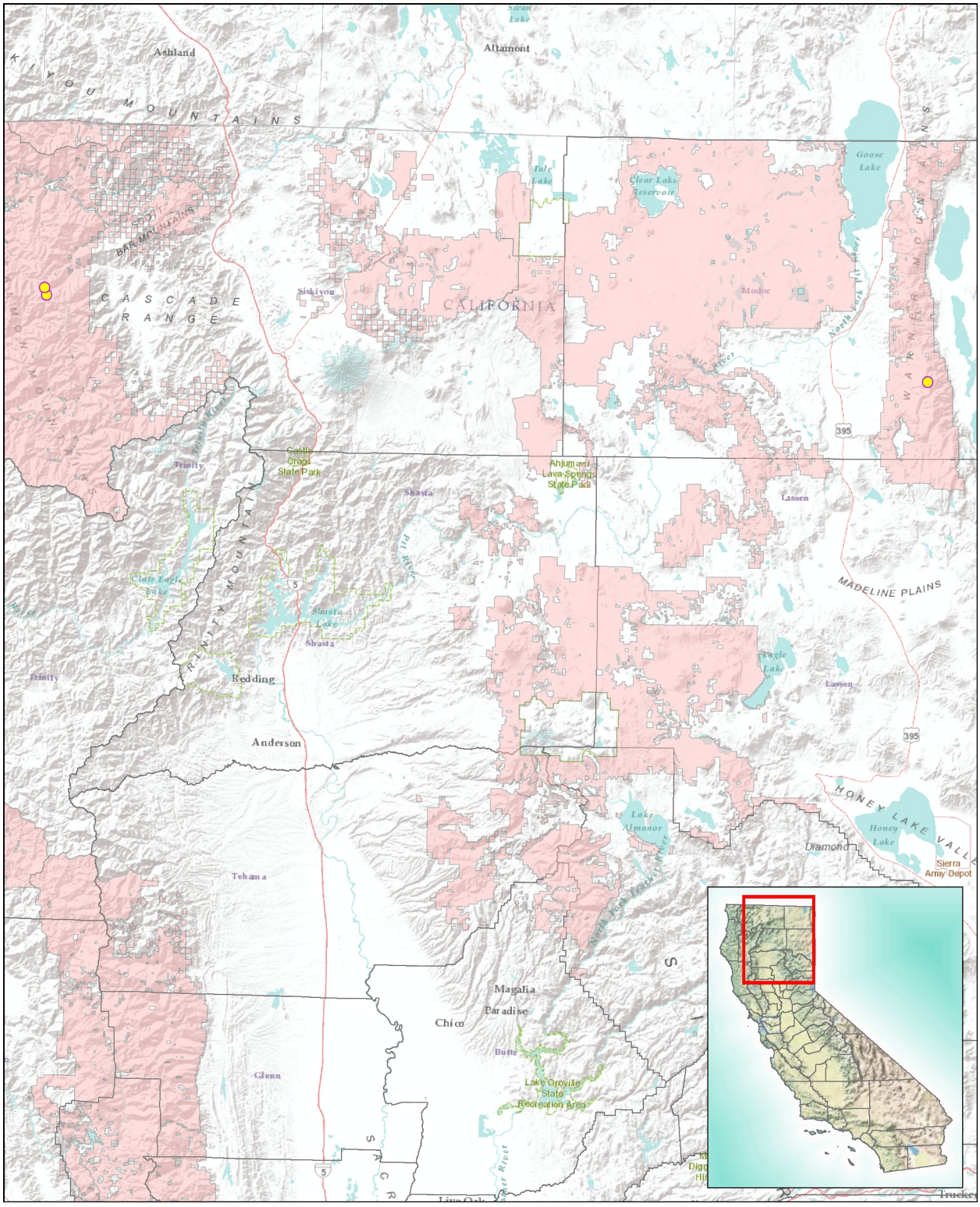
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G5	CA: S1 NV: SNR OR: Not listed	2B.3	Not listed	Not listed	Not listed

NPPA:	SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Do not track	Not listed	Not listed	Not listed	Not listed

Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2017b), 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 Ranks (CDFW 2017a; NatureServe 2017); S-rank=Subnational (state or province-level) Conservation Status Ranks (CDFW 2017a; NatureServe 2017; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2017); 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); NPPA=Native Plant Protection Act Status (CDFW 2017b); 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: *Saxifraga cespitosa* is a circumboreal taxon that is found throughout the arctic, western North America, and parts of eastern North America (Park 2017). *Saxifraga cespitosa* is also represented by disjunct occurrences in South America (CNPS 2017). It is restricted to three element occurrences in California (CNDDB 2017). Two of these occurrences are within the Klamath NF in the Marble Mountains (CNDDB 2017; Calflora 2017). The third California occurrence is within the Modoc NF in the Warner Mountains near Patterson Lake (CNDDB 2017).



Basemap Sources: Main map: Esri, DeLorme, USGS, NOAA, NPS. California inset map: © 2013 National Geographic Society, i-cubed.

Locations within California:

(Note: 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 (CNDDB) definition of Element Occurrences in California). Official Element Occurrence (EO) numbers for plants in California are determined solely by the CNDDB and are included within the Reference (Source) column for CNDDB 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 in meters from source were 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) column unless additional citation is given.)

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
1	Patterson Lake, Warner Mountains.	Modoc	Warren Peak (4112042)	CNDDB, May 2017 (EO 1)	16-Jul-1989	Only source of information for this site is 1989 collection by Schoolcraft and York.		Modoc NF	9100
1	s of Patterson Lake; Warner Mountains, Eagle Lake Area	Modoc	Warren Peak (4112042)	CCH, Jan 2017 (UC1567388)	16-Jul-1989			Modoc NF	9199
1	Warner Mtns. near Patterson Lake., T41N R15 E sec22	Modoc	Eagle Peak (4112032)	Calflora, May 2017 (xr86218)	6-Apr-1989	1+ individuals		Modoc NF	8642
1	Warner Mtns. near Patterson Lake., T41N R15 E sec22	Modoc	Eagle Peak (4112032)	Calflora, May 2017 (xr87887)	16-Jul-1989	1+ individuals		Modoc NF	8642
2	Meadows of Marble Valley, Marble Mountains.	Siskiyou	Marble Mountain (4112352)	CNDDB, May 2017 (EO 2)	12-Aug-1980	Only source of information for this site is 1980 collection by Sawyer and Mesler.		Klamath NF	6000
3	Marble Mountains - Black Marble Mt	Siskiyou	Boulder Peak (4112351)	Calflora, May 2017 (jgr6618)	10-Jul-2004	1+ individuals		Klamath NF	8241

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
3	n side of Black Mountain (Marble Mountain Wilderness Area); , Marble Mountain Wilderness Area	Siskiyou	Dutch Creek (4112381)	CCH, Jan 2017 (JEPS33850)	31-Jul-1966			Klamath NF	

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)	CNDDB EOs	Non-CNDDB 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:	2, 3	1	1	1	1	10-Jul-2004	-	2
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	1	1	0	0	1	16-Jul-89	0	1
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	-	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	2	1	1	2	N/A	0	3

Demographic and Population Trends: Population level information is lacking from the three occurrences reported in California. Element occurrence 3 from the Marble Mountains indicates that 1+ individuals were observed (CNDDB 2017). More fieldwork is needed in order to determine the ongoing trends among California populations of *Saxifraga cespitosa*.

Life History: *Saxifraga cespitosa* is a perennial herb that blooms from June until September (CNPS 2017). It has a trailing stem and cauline leaves that are sessile and obovate with 3-5 lobes at its tips (Park 2017). On a global scale, *S. cespitosa* is considered a member of the arctic-alpine

flora and is among the initial vegetation to occupy habitat exposed by retreating glaciers (Gabrielsen et al. 1997). It occurs in a wide variety of places such as rock crevices, gravelly tundra, mountaintops, and scree slopes (Gabrielsen et al. 1997). *Saxifraga cespitosa* is largely known to self pollinate in European populations. Albeit, these same populations also have plants that are functionally female, a mechanism thought to promote outcrossing (Gabrielsen et al. 1997). Plants are known to form dense cushions in exposed conditions. Many arctic-alpine plants lack adaptations for long distance dispersal, and *Saxifraga cespitosa* is considered one such taxon that lacks these adaptations (Gabrielsen et al. 1997). In a study on *S. oppositifolia*, researchers documented floral visitation from *Bombus* sp. (queens), diurnal Lepidoptera, and small Diptera. This same study demonstrated that flowering times closely followed the timing of the snowmelt, where blooming occurred progressively as snow melted (Stenstrom and Molau 1992).

Diversity: *Saxifraga cespitosa* is one of 390 species in the genus *Saxifraga*. The genus *Saxifraga* is the largest of the 33 genera in the Saxifragaceae, and is found in the Americas, Eurasia, and northern Africa, where much of the diversity is in north-temperate, arctic, and montane regions (Brouillet and Elvander 2009; Park 2017; Stevens 2001). Substantial genomic variation is observed, where chromosome numbers for the genus range from 2n=10 to 2n=198 (Soltis et al. 1996). In addition to the molecular diversity of the group, the genus *Saxifraga* exhibits a range of morphological and ecology patterns. Member of this genus inhabit grasslands, woodlands, tundra, scree-slopes, and rock faces (Soltis et al. 1996). Characters used to differentiate among *Saxifraga* taxa are often used at the family level, further addressing the morphological complexity of the group. Leaves of some taxa can be broad, long, and lobed or reduced to tiny scales in other taxa. Leaves may be alternate or opposite. Ovaries can range from fully superior to completely inferior. Members of *Saxifraga* may also assume a spreading and mat like stature or be tall single stemmed plants (Soltis et al. 1996). Classification within the genus has been problematic. At one time, the genus was split into 16 segregate genera (Soltis et al. 1996). Molecular phylogenies constructed from nuclear genes (nrITS) are strongly at odds with classification schemes based on morphology. In addition, nuclear and chloroplast phylogenies are incongruent, suggesting recent reticulation and incomplete sorting of genes within designated taxa (Vargas 2000). Cytological instability, morphological and molecular incongruence, and considerable infraspecific variation are all signs of a taxonomically complex and dynamic group (Soltis et al. 1996; Vargas 2000; Brouillet and Elvander 2009). *Saxifraga cespitosa* has documented chromosome counts of 2n= 52, 56, 60, 63, 65, 78, and 80 (Brouillet and Elvander 2009; Park 2017). Upward of five subspecies and varieties have been recognized for *S. cespitosa*. Although, assigning individuals to subspecific ranks may be futile, given that many characters overlap and there is a lack of geographic or ecological cohesion among the designations (Brouillet and Elvander 2009). On a global scale, *S. cespitosa* is considered a member of the arctic-alpine flora, and has an evolutionary history shaped by events associated with quaternary glacial cycles. The extensive variation within this species may be due to its history and occupation of isolated glacial refugia (Gabrielsen et al. 1997). The only southern hemisphere representatives of *Saxifraga* are closely related to *S. cespitosa* (Brouillet and Elvander 2009).

Habitat: The two California occurrences of *S. cespitosa* are associated with rocky meadows and seeps in Modoc (Warren Peak) and Siskiyou (Marble Mountains) counties (CNPS 2017). Outside of California, *S. cespitosa* is found on rock outcrops, crevices, talus, scree slopes, rocky tundra, fellfields, nunataks, and stream banks (Brouillet and Elvander 2009). Records from outside California, in the Pacific Northwest, indicate that *S. cespitosa* grows alongside *Tsuga mertensiana, Chamaecyparis nootkatensis, Pinus contorta, Cassiope mertensiana, Adiantum aleuticum, Aspidotis densa, Polystichum lemmonii, Saxifraga oppositifolia, Cardamine purpurea, Silene acaulis, Chamerion latifolium, Micranthes nelsonianum, Cerastium arvense, Saxifraga hirculus, Campanula lasiocarpa, Dryas* sp., *Picea engelmannii*, and *Pinus flexilis* (CPNWH 2017).

Habitat Status or Trend: *Saxifraga cespitosa* assumes a circumboreal distribution and is widely found outside California (Park 2017; CPNWH 2017; Gabrielsen et al. 1997; Brouillet and Elvander 2009). It has a global rank of G5 and is considered imperiled (S2) or critically imperiled (S1) in pockets of Canada (Manitoba and Ontario) and southern latitudes of North America (Arizona, Mexico, and California) (NatureServe 2017). Very little is known about California occurrences. There are two California occurrences; one in the Klamath NF (last seen 1980) and on the Modoc NF (last seen 1989). Collections that are associated with these occurrences provide the only source of information about *S. cespitosa* within the boundaries of California (CNDDB 2017).

Capacity for the Species to Disperse: Direct information on the dispersal capacity *S. cespitosa* is unknown. Arctic-alpine associates are considered to lack adaptations to long-distance dispersal. *Saxifraga cespitosa* is considered as such, although, at lower latitudes, dispersal distances may be greater (Gabrielsen et al. 1997).

Threats: Direct and specific threats to *S. cespitosa* are unknown. Further study is needed in order to determine immediate threats to California occurrences.

Literature Cited

[BLM] Bureau of Land Management. 2010. Special Status Plants in California, Including BLM Designated Sensitive Species. February 8, 2010. Available at: https://www.blm.gov/ca/dir/pdfs/2010/im/CAIM2010-008ATT2B.pdf [accessed 25 May 2017].

Brouillet, L. and P. Elvander. 2009. *Saxifraga*. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 20+ vols. New York and Oxford. Vol. 8, http://www.efloras.org/.

Calflora. 2017. Information on wild California plants for conservation, education, and appreciation. Website http://www.calflora.org/ [accessed 14 June 2017].

[CDFG] California Department of Fish and Game. 2013. 24K Quads, SDE Feature Class. Index for 1:24,000-scale (24K), 7.5-minute by 7.5-minute, paper U.S. Geological Survey maps in California.

[CDFW] California Department of Fish and Wildlife. 2015. California State Wildlife Action Plan, 2015 Update: A Conservation Legacy for Californians; Volume II, Appendix C: Species of

Greatest Conservation Need. Gonzales, A. G. and J. Hoshi (eds.). Prepared with assistance from Ascent Environmental, Inc., Sacramento, CA. Available at: https://www.wildlife.ca.gov/swap/final [accessed 11 May 2017].

[CNDDB] California Department of Fish and Wildlife, Natural Diversity Database. 2017. RareFind 5 [Internet application] and CNDDB Maps and Data. Available at: https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data [Government Version, June 2017].

[CDFW] California Department of Fish and Wildlife, Natural Diversity Database. 2017a. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly publication. 126 pp.

____. 2017b. State and Federally Listed Endangered, Threatened, and Rare Plants of California. July 2017. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109390&inline [accessed 11 September 2017].

[CNPS] California Native Plant Society, Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed May 17, 2017].

[CPAD] California Protected Areas Database. 2016. Version 2016b1. GreenInfo Network. Available at: http://www.calands.org/.

[CCH] Consortium of California Herbaria. 2017. Data provided by the participants of the Consortium of California Herbaria. Regents of the University of California, Berkeley. Website http://ucjeps.berkeley.edu/consortium/ [accessed 16 May 2017].

[CPNWH] Consortium of Pacific Northwest Herbaria. 2017. Data provided by the participants of the Consortium of Pacific Northwest Herbaria. University of Washington Herbarium. Website http://www.pnwherbaria.org/data/search.php [accessed 11 August 2017].

Gabrielsen, T. M., K. Bachmann, K. S. Jakobsen, and C. Brochmann. 1997. Glacial survival does not matter: RAPD pylogeography of Nordic *Saxifraga oppositifolia*. Molecular Ecology 6(9): 831–842.

[IUCN] International Union for Conservation of Nature. 2017. The IUCN Red List of Threatened Species. Website http://www.iucnredlist.org/ [accessed 26 May 2017].

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Website http://explorer.natureserve.org [accessed 17 May 2017].

[NDF] Nevada Division of Forestry. 2012. NAC 527.010 List of fully protected species of native flora. April 2012. Available at: https://www.leg.state.nv.us/NAC/NAC-527.html#NAC527Sec010 [accessed 12 May 2017].

[NNHP] Nevada Natural Heritage Program. 2017. Species Lists. Department of Conservation and Natural Resources. Available at: http://heritage.nv.gov/species/lists.php [accessed 25 May 2017].

[ODA] Oregon Department of Agriculture. 2014. Oregon listed and candidate plants - complete list. Native Plant Conservation Program. August 13, 2014. Available at:

https://data.oregon.gov/Natural-Resources/Oregon-listed-and-candidate-plants-complete-list/8s3k-ygh2 [accessed 25 May 2017].

[ODFW] Oregon Department of Fish and Wildlife. 2016. Oregon Conservation Strategy, Chapter 6: Strategy Species. Oregon Department of Fish and Wildlife, Salem, Oregon. PDF content last updated December 30, 2016. Available at: http://oregonconservationstrategy.org/ [accessed 25 May 2017].

[ORBIC] Oregon Biodiversity Information Center. 2016. Rare, Threatened and Endangered Species of Oregon. Institute for Natural Resources, Portland State University, Portland, OR. 130 pp. Available at: http://inr.oregonstate.edu/sites/inr.oregonstate.edu/files/2016-rte-book.pdf [accessed 25 May 2017].

Park, M.S. 2017. Jepson Flora Project (eds.). Jepson eFlora, http://ucjeps.berkeley.edu/eflora/ [accessed 5 September 2017].

Stenström, M. and U. Molau. 1992. Reproductive ecology of *Saxifraga oppositifolia*: Phenology, mating system, and reproductive success. Arctic and Alpine Research 24(4): 337–343.

Stevens, P. F. 2001+. Angiosperm Phylogeny Website. Version 12, July 2012 [and more or less continuously updated since]. Website http://www.mobot.org/MOBOT/research/APweb/.

Soltis, D. E., R. K. Kuzoff, E. Conti, R. Gornall, and K. Ferguson. 1996. MatK and RbcL gene sequence data indicate that *Saxifraga* (Saxifragaceae) is polyphyletic. American Journal of Botany 83(3): 371–382.

Tropicos. 2017. Missouri Botanical Garden. Website http://www.tropicos.org [accessed 16 May 2017].

[USDA] U.S. Department of Agriculture Forest Service, Pacific Southwest Region. 2013. Regional Forester Sensitive Species List. Available at: http://www.fs.usda.gov/main/r5/plants-animals/plants [accessed 9 May 2017].

[USDA] U.S. Department of Agriculture Forest Service and U.S. Department of Interior Bureau of Land Management. 2001. List of Survey and Manage Species in Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures; as amended by Annual Species Reviews 2001-2003. Available at: https://www.blm.gov/or/plans/surveyandmanage/files/sm-fs-enc3-table1-1-dec2003wrtv.pdf [accessed 12 September 2017].

[USDA] U.S. Department of Agriculture, Natural Resources Conservation Service. 2017. PLANTS Database. Website http://plants.usda.gov/ [accessed 16 May 2017].

Persons Contacted:

Sanger, A., K. Bovee, D. Lepley, W. Boes, and H. Guenther. 2017. Lassen and Modoc National Forest botanists. Information submitted at Modoc/Lassen FS-SCC and IPA Workshop, Susanville, CA. 25-26 July 2017.

Taylor, D. Wm. 2017. Environmental contractor, Aptos, CA. Information submitted at Modoc/Lassen FS-SCC and IPA Workshop, Susanville, CA. 25-26 July 2017.

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September 14, 2017

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.