Plant Species Evaluation Form

Trifolium howellii S. Watson

HOWELL'S CLOVER

Family: Fabaceae (CNPS 2018)

PLANTS Symbol: TRHO (USDA 2018)

Calif. Endemic: No (CNPS 2018)

Synonyms/Other Names: Described in 1888. No other names or synonyms have been used to refer to this taxon (Tropicos 2018).

Identification Issues: Related to *T. productum* and *T. kingii* (Gillett 1972). California distributions of *T. howellii* and *T. productum* overlap in the Klamath Mountains. *Trifolium howellii* is distinguished from *T. productum* by its large leaflets (4-10 cm), fruit with short stalk-like bases (~1 mm), and its affinity to wet and shady habitat. *Trifolium productum* has smaller leaflets (1-5.4 cm), longer stalk-like fruit bases (2-4 mm), and is typically found in conifer forests, meadows, and open ridges (Vincent and Isely 2018).

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: +- 300 species: temps, tropical mountains, northern hemisphere, South America, Africa; foodplant for lepidopterans, cultivated as green manure in crop rotation, fodder. Etymology: (Latin: 3 leaves).

Genus Description – Habit: Annual, perennial herb, unarmed. Leaf: generally palmately compound; stipules conspicuous, partly fused to petiole, generally papery or membranous; leaflets generally 3, occasionally 5--9, +- toothed or wavy. Inflorescence: raceme (generally umbel-like), head, or spike, axillary or terminal, generally many-flowered, generally involucred, generally peduncled; inflorescence bracts 0 or forming vestigial ring or involucre; flower bracts present or not. Flower: generally spreading to erect, generally becoming reflexed; corolla generally purple to pale lavender, occasionally yellow, persistent after flower; 9 filaments fused, 1 free. Fruit: generally indehiscent but generally breaking, short, plump, generally enclosed in corolla; base generally stalk-like. Seed: 1--6.

Species Description – Habit: Perennial herb, generally robust, glabrous. Stem: erect. Leaf: generally cauline; stipules of mid-leaves 1--2.5 cm, green; leaflets 4--10 cm, elliptic to ovate. Inflorescence: head- or short-raceme-like, 1.5--3 cm; axis generally exserted 2--3 mm; flowers becoming reflexed. Flower: calyx 3.5--4.5 mm, tube 10-veined, lobes slender, +- >= tube; corolla 9--14 mm, green-white to pink. Fruit: stalk-like base +- 1 mm. Seed: 1--3. eFlora Treatment Author: Michael A. Vincent & Duane Isely.

Status:

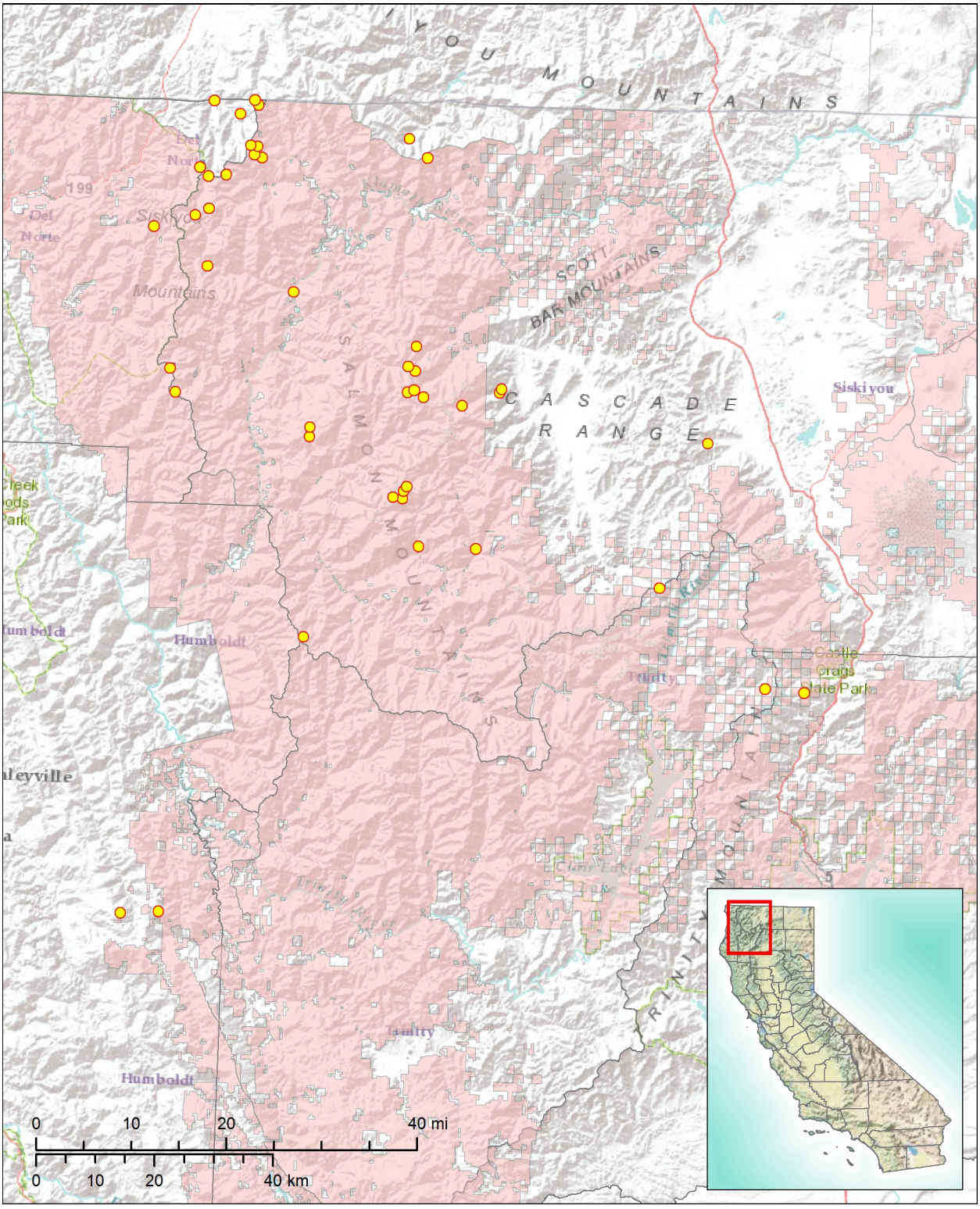
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G4	CA: S4 NV: Not listed OR: Not listed	4.3	Not listed	Not listed	Not listed

SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Not listed	Not listed	Not listed	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 United States within northern California and Oregon. Plants in California are found in the northern North Coast Ranges (n NCoR) and northern Klamath Ranges (n KR) bioregions within Del Norte, Humboldt, Siskiyou, Trinity, and Shasta counties. A single implausible and disjunct record is located in Plumas County. A majority (29/44; ~66%) of California occurrence records are found on NFS lands within Klamath NF (26/29; ~90%) and Six Rivers NF (3/29; ~10%) (Calflora 2017; CCH 2017; Vincent and Isely 2018).



Sources: *Distribution*: Calflora 2017, 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).

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 (CNDDB 2017) definition of Element Occurrences (EOs) in California. Official 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 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	Snow Camp Lake; un-named tributary to Redwood Creek not shown on USGS map 1 mile NE of the lake	Humboldt	Grouse Mtn. (4012376)	Calflora, May 2017 (xr168783)	3-Aug-2006	1+ individuals			4111
1	Snow Camp Lake; un-named first-order tributary to Redwood Creek not shown on USGS map 1 mile NE of the lake	Humboldt	Grouse Mtn. (4012376)	CCH, Jan 2017 (CHSC98381)	3-Aug-2006				4100
1	Snow Camp Lake; un-named first-order tributary to Redwood Creek not shown on USGS map 1 mile NE of the lake	Humboldt	Grouse Mtn. (4012376)	CCH, Jan 2017 (JEPS109912)	3-Aug-2006				4100
2	Grouse Mountain; top of mountain	Humboldt	Grouse Mtn. (4012376)	CCH, Jan 2017 (RSA168895)	18-Jul-1934				
2	at top Grouse Mtn	Humboldt	Grouse Mtn. (4012376)	CCH, Jan 2017 (UC1223452)	18-Jul-1934				5000
3	Trinity Mountains. Flume Creek watershed, canyon of Sacramento River, logging road 38N28 7.8 road miles up (West) from gate on frontage road paralleling Interstate 5 at the Conat Road exit (ca.9 miles SW of Dunsmuir)	Shasta	Chicken Hawk Hill (4112214)	CCH, Jan 2017 (CHSC110783)	21-Aug-2012				4650

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
4	logging road below Tamarack Lake, East Fork Trinity River; seepage area ca. 300 m south of area shown on topographic maps as 4991T , ca. 0.2 mi N of the creek crossing	Trinity	Seven Lakes Basin (4112224)	Calflora, May 2017 (xr169070)	7-Aug-2002	1+ individuals			5112
5	Along the Little North Fork of the Salmon River	Siskiyou	Salmon Mtn. (4112324)	CCH, Jan 2017 (POM349628)	1-Jul-1976			Klamath NF	2402
6	Scott Mountains, border between Trinity and Siskiyou Counties. Along Hwy 3 between Callahan and Coffee Creek, near Scott Mountain Campground. Serpentine area along Pacific Crest Trail, heading E from Hwy 3	Trinity	Scott Mountain (4112236)	CCH, Jan 2017 (CAS1065352)	18-Jul-2005				5906
7	North Fork on Salmon River at Finley Camp	Siskiyou	Tanners Peak (4112331)	CCH, Jan 2017 (DS278651)	18-Aug-1928				
8	Streamside terraces and lower slopes along the Little N Fork of the Salmon River.	Siskiyou	Sawyers Bar (4112332)	CCH, Jan 2017 (HSC42955)	1-Jul-1976			Klamath NF	2402
9	North west of Pine Lake. The Salmon Mountains. High Lake Basins in the vicinity of English Peak. Marble Mountain Wilderness Area.	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (RSA237884)	6-Aug-1969			Klamath NF	6178
10	Pine Lake Meadow; elev. 6150 ft	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (HSC30416)	17-Jul-1968			Klamath NF	6152

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
10	Pine Lake Meadow. The Salmon Mountains. High Lake Basins in the vicinity of English Peak. Marble Mountain Wilderness Area.	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (RSA237887)	17-Jul-1968			Klamath NF	6152
10	vicinity English Peak (Pine Lake Meadow); Salmon Mtns, Marble Mtn Wilderness area	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (UC1409202)	17-Jul-1968			Klamath NF	6150
11	English Lake inlet	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (HSC69726)	15-Jul-1980			Klamath NF	5840
12	Finley's Upper Camp near head of north fork of Salmon River	Siskiyou	English Peak (4112342)	CCH, Jan 2017 (CAS634237)	18-Aug-1928			Klamath NF	5500
13	Marble Mtn Wilderness area Marble Valley	Siskiyou	Somes Bar (4112344)	CCH, Jan 2017 (JEPS80509)	24-Jul-1966			Klamath NF	5881
14	Lime Gulch; bordering Shasta Valley (about 15 miles south of Yreka)	Siskiyou	China Mtn. (4112245)	CCH, Jan 2017 (JEPS98770)	19-Jun-1996				3900
15	Near Haypress Creek, Haypress Meadows, Marble Mountain Wilderness Area;	Siskiyou	Ukonom Mtn. (4112354)	CCH, Jan 2017 (RSA261447)	27-Jul-1974			Klamath NF	4800
15	Siskiyou County: Near Haypress Creek, Haypress Meadows, Marble Mountain Wilderness Area	Siskiyou	Ukonom Mtn. (4112354)	CCH, Jan 2017 (UCD109135)	27-Jul-1974			Klamath NF	4800
16	below Log Lake (canyo of Shackelford Cree)	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (JEPS65929)	5-Aug-1918			Klamath NF	4700

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
16	below Log Lake (canyon, Shackleford Creek)	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (JEPS48898)	3-Aug-1908			Klamath NF	
16	below Log Lake (canyon); Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (UC164078)	3-May-1908			Klamath NF	
17	Flint Valley	Siskiyou	Chimney Rock (4112356)	CCH, Jan 2017 (UC1152151)	20-Jul-1950			Klamath NF	4600
18	Sky High Valley, Marble Mountains, edge of stream	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (DS342795)	30-Jul-1949			Klamath NF	5800
18	Sky High Valley Marble Mtns	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (UC922394)	30-Jul-1949			Klamath NF	5800
18	Sky High Valley, Marble Mts.	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (CAS272008)	7-Aug-1939			Klamath NF	6000
19	Marble Valley along creek, Marble Mountains.	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (RSA184746)	24-Jul-1966			Klamath NF	5883
20	Marble Mountains - Marble Valley Tr	Siskiyou	Marble Mountain (4112352)	Calflora, May 2017 (jgr6651)	11-Jul-2004	1+ individuals		Klamath NF	5774
20	Marble Valley, along creek	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (CAS476348)	24-Jul-1966			Klamath NF	5881

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
20	Klamath National Forest	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (CAS717840)	6-Aug-1933			Klamath NF	5800
21	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (POM313506)	21-Jun-1926				
21	Shackleford Creek.	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (POM28044)	9-Jul-1910				4003
21	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (UC164459)	9-Jul-1910				4000
21	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (HSC2319)	8-Jul-1910				4003
21	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (UC630859)					
22	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (CAS61346)	9-Jul-1910				4000
22	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (DS36396)	9-Jul-1910				4000
22	Shackleford Creek	Siskiyou	Boulder Peak (4112351)	CCH, Jan 2017 (DS118427)	3-Aug-1908				

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
23	Near Elk Valley, close to the town of Orleans	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (HSC76100)	29-Jul-1979			Six Rivers NF	4482
23	Elk Valley.	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (HSC61272)	14-Jul-1960			Six Rivers NF	
23	Elk Valley	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (HSC61273)	14-Jul-1960			Six Rivers NF	5000
23	Elk Valley.	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (HSC61274)	14-Jul-1960			Six Rivers NF	
23	Elk Valley; At head of Blue crk, one mi E of Chimney rock	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (OBI12674)	19-Jul-1950			Six Rivers NF	
23	Elk Valley; At head of Blue crk, one mi E of Chimney rock	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (OBI23001)	19-Jul-1950			Six Rivers NF	
23	1 mi e Chimney Rock (at head of Blue Creek, adjacent to s end of valley); Elk Valley	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (UC1152152)	19-Jul-1950			Six Rivers NF	4400
23	Del Norte County: Elk Valley. At head of Blue Creek, 1 mile E of Chimney Rock	Del Norte	Chimney Rock (4112356)	CCH, Jan 2017 (UCD109136)	19-Jul-1950			Six Rivers NF	4400
24	Marble Mountain Wilderness Area. Ridge north of Jump off. Seep 1/2 mi. south of Paradise Lake	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (CAS1009048)	31-Jul-1976			Klamath NF	

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
25	Marble Mountain Wilderness Area, Ridge N of Jump off, 1/2 mi. S of Paradise Lake	Siskiyou	Marble Mountain (4112352)	CCH, Jan 2017 (HSC77108)	31-Jul-1976			Klamath NF	
26	w side Kelsey Creek (Hammond Camp); North Coast Ranges, Marble Mtns	Siskiyou	Grider Valley (4112362)	CCH, Jan 2017 (UC1299169)	15-Jul-1951			Klamath NF	5000
27	Siskiyou Mountains: Clear Creek, 1 mile below West Fork.	Siskiyou	Clear Creek (4112364)	CCH, Jan 2017 (RSA624996)	27-Aug-1963				2200
28	Siskiyou Mtns. Clear Creek, 1 mi. below West Fork.	Siskiyou	Bear Peak (4112365)	CCH, Jan 2017 (UCR110583)	27-Aug-1963			Klamath NF	2201
29	Bear Basin	Del Norte	Devils Punchbowl (4112376)	CCH, Jan 2017 (RSA19220)	28-Aug-1938			Six Rivers NF	
30	Clear Creek Trail crossing, Trout Camp	Siskiyou	Devils Punchbowl (4112376)	CCH, Jan 2017 (HSC62305)	5-Aug-1955			Klamath NF	
31	Rattlesnake Meadow	Siskiyou	Devils Punchbowl (4112376)	CCH, Jan 2017 (HSC69400)	8-Aug-1980			Klamath NF	5400
31	Rattlesnake Meadow, near Preston Peak	Siskiyou	Preston Peak (4112375)	CCH, Jan 2017 (DS278650)	24-Aug-1929			Klamath NF	5000
32	Youngs Valley.	Siskiyou	Broken Rib Mtn. (4112386)	CCH, Jan 2017 (HSC62272)	31-Aug-1957			Klamath NF	

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
33	Near Marv's Meadow	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (HSC58924)	11-Aug-1971			Klamath NF	4803
34	0.5 miles south of Sanger Lake	Del Norte	Broken Rib Mtn. (4112386)	CCH, Jan 2017 (SD88482)	4-Jul-1972			Six Rivers NF	5401
34	.5 mile south of Sanger Lake.	Del Norte	Broken Rib Mtn. (4112386)	CCH, Jan 2017 (SDSU5280)	4-Jul-1972			Six Rivers NF	5400
35	Kelley Lake and Kelley Lake Trail	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (HSC61459)	18-Jul-1939			Klamath NF	4501
36	Pokerflat and part trail to Kelly Lake	Siskiyou	Polar Bear Mtn. (4112385)	Calflora, May 2017 (xr979)	7-Jul-2005	1+ individuals		Klamath NF	5171
37	Lily Pad Lake	Siskiyou	Kangaroo Mtn. (4112382)	CCH, Jan 2017 (HSC68986)	24-Jul-1980			Klamath NF	5801
38	s Little Greyback Mtn (Poker Flat)	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (JEPS41328)	18-Jul-1939			Klamath NF	5000
39	Poker Flat	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (HSC61931)	13-Jul-1960			Klamath NF	5200
39	Poker Flat	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (HSC61930)	18-Jul-1939			Klamath NF	5200

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
40	ca 1/2 mi se Red Butte (ca 7 mi nne of Seiad Valley, sw of Cook and Green Pass)	Siskiyou	Kangaroo Mtn. (4112382)	CCH, Jan 2017 (JEPS84185)	16-Jul-1986			Rogue River NF	5676
40	ca 1/2 mi se Red Butte (ca 7 mi nne of Seiad Valley, sw of Cook and Green Pass)	Siskiyou	Kangaroo Mtn. (4112382)	CCH, Jan 2017 (JEPS84259)	16-Jul-1986			Rogue River NF	5676
41	Dunne Creek	Del Norte	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (JEPS65925)	31-Jul-1938			Siskiyou NF	3500
42	n Summit crossing (on the Takilma-Happy Camp Rd); Siskiyou Mtns	Siskiyou	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (UC1223368)	6-Jun-1951			Siskiyou NF	
43	just w corner of Siskiyou Co. (exactly at the Josephine Co., Oregon, line, on Waldo-Happy Camp Rd, on fork of Dunn Creek.); Siskiyou Mtns	Del Norte	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (UC595090)	6-Aug-1938			Siskiyou NF	4500
43	tributaries if Dunn Creek Headwaters Illinois River, East Fork	Del Norte	Polar Bear Mtn. (4112385)	CCH, Jan 2017 (JEPS65924)	30-Jul-1937			Siskiyou NF	
44	Exactly at the Josephine Do., Oregon, line and just W. of the corner of Siskiyou Co., on Waldo-Happy Camp road, Siskiyou Mts. In wet, shady place on fork on Dunn Creek	Del Norte	Takilma (4212315)	CCH, Jan 2017 (CAS282471)	6-Aug-1938			Siskiyou NF	4500

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
44	Exactly at the Josephine Co., Oregon, line and just W. of the corner of Siskiyou Co., on Waldo-Happy Camp road, Siskiyou Mts. In wet, shady place on fork of Dunn Creek	Del Norte	Takilma (4212315)	CCH, Jan 2017 (DS266134)	6-Aug-1938			Siskiyou NF	4500
44	Exactly at the Josephine Co., Oregon, line and just W. of the corner of Siskiyou Co., on Waldo-Happy Camp road, Siskiyou Mts. In wet, shady place on fork of Dunn Creek	Del Norte	Takilma (4212315)	CCH, Jan 2017 (DS683111)	6-Aug-1938			Siskiyou NF	4500

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:	5,8,9,10, 11,12,13, 15,16,17, 18,19,20, 24,25,26, 28,30,31, 32,33,35, 36,37,38, 39	-	26	2	24	7-Jul-2005	15	26
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	-	-	-	-	-	-	-	0
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	5	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	23,29,34	-	3	-	3	29-Jul-1979	12	3
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	0	29	2	27	N/A	32	29

Demographic and Population Trends: Total number of occurrences for this taxon were estimated using GIS tools and methods described by Green and Sims (2018). Population count and size estimate data are lacking for this taxon. All but six California occurrence records (38/44; ~89%) are historic and have not been documented in more than 20 years (CCH 2017).

Life History: *Trifolium howellii* is a perennial herb that blooms from June through August (CNPS 2018). Plants are glabrous, rhizomatous, and have stout woody roots. Stems are fistulose, clumped, and emerge from a woody crown (Gillett 1972). The association between bees and members *Trifolium* is well established (OGTR 2008; Palmer-Jones et al. 1966). Short tongued

bees, like *Bombus terrestris*, are known to bite holes in the bottom of the corolla of certain *Trifolium* species. Long-tongued bee species provide a greater contribution to the pollination efforts of *T. pratense* (Palmer-Jones et al. 1966). Pollination studies on *T. repens* indicate that pollen grains from a pollen donor are deposited on the next 15-20 inflorescences that a particular bee visits. This can occur sporadically until about the 50th inflorescence. An additional study on *T. pratense* demonstrated that 60% of visited flowering heads are within 10 cm of the previously visited head, whereas only 13.6% were beyond 25 m (OGTR 2008). Germination of the *T. repens* pollen tube occurred almost immediately when placed on conspecific stigmas. Pollen grain germination was demonstrated to take longer and occur less frequently among pollen grains between more distantly related taxa. Pollen grain germination was shown to be more successful, occur sooner, and behave more normally with closely related taxa (Chen and Gibson 1972).

Diversity: *Trifolium howellii* is one of roughly 300 species in the genus *Trifolium* (Vincent and Isely 2018). This taxon is one of 72 species within *Trifolium* sect. *Involucrarium*. Section *Involucrarium* represents a strongly supported clade of taxa restricted to the western hemisphere. Monophyly of this section suggests a single common origin for all North and South American species. Shifts between annual and perennial life forms has occurred across most sections of *Trifolium*. Section *Involucrarium* has a perennial ancestral character state, with the annual life history strategy having evolved at least twice (Ellison et al. 2006). Morphology suggests that *T. howellii* is closely related to *T. productum* and *T. kingii* (Gillett 1972).

Habitat: Plants are typically found in shady woods, wet stream banks, river flood plains, springs, and thickets (Gillett 1972). Plants are also found in alder swamps and growing alongside sedges in meadows (Vincent and Isely 2018).

Habitat Status or Trend: Status and trends associated with habitat preferred by *T. howellii* remain unknown.

Capacity for the Species to Disperse: Dispersal capacity of *Trifolium howellii* has not been documented. There is a considerable body of literature pertaining to the common white clover, *Trifolium repens*. This widespread entity is known to survive passage through digestive tracts of birds and grazing animals. Short distance dispersal of *T. repens* is thought to be facilitated by fruit dehiscence, livestock trampling, worms, ants, and wind (OGTR 2008). The calyx and corolla of plants within the genus *Trifolium* remain persistent after anthesis and are involved in fruit dispersal (Ellison et al. 2006).

Threats: Direct threats to *T. howellii* are unknown, and there are no threats indicated for this species in the CNPS *Inventory of Rare and Endangerd Plants* (CNPS 2018).

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].

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, May 2017].

[CDFW] California Department of Fish and Wildlife, Natural Diversity Database. 2018a. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly publication, January 2018. 127 pp. Available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383 [accessed 22 January 2018].

____. 2018b. State and Federally Listed Endangered, Threatened, and Rare Plants of California. Last updated January 2018. 6 pp. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109390&inline [accessed 22 January 2018].

[CDF] California Department of Forestry and Fire Protection. 2009. 1:24,000 County Boundaries (cnty24k09_1_poly) [shapefile]. California Department of Forestry and Fire Protection, California Department of Fish and Game. Berkeley Library Geodata. Available at: https://geodata.lib.berkeley.edu/catalog/ark28722-s73w23 [10 December 2017].

[CNPS] California Native Plant Society, Rare Plant Program. 2018. *Inventory of Rare and Endangered Plants of California* (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 22 January 2018].

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

Chen, C. C. and P. B. Gibson. 1972. Barriers to hybridization of *Trifolium repens* with related species. *Canadian Journal of Genetics and Cytology* 14(2): 381-389.

[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].

Ellison, N. W., A. Liston, J. J. Steiner, W. M. Williams, and N. L. Taylor. 2006. Molecular phylogenetics of the clover genus (*Trifolium*-Leguminosae). *Molecular Phylogenetics and Evolution* 39(3): 688-705.

Esri. 2012. World Reference Overlay [basemap overlay]. Scale Range: 1:591,657,528 down to 1:72,224. Esri, DeLorme, USGS, NPS. Updated 2 September 2017. Available at: http://www.arcgis.com/home/item.html?id=9763d83ba63048da8a2e0a71ccea4416 [8 December 2017].

____. 2017a. USA Topo Maps [basemap]. Scale Range: 1:591,657,528 down to 1:18,056. National Geographic Society, i-cubed, 2013. Updated 5 October 2017. Available at: http://www.arcgis.com/home/item.html?id=99cd5fbd98934028802b4f797c4b1732 [8 December 2017].

____. 2017b. World Terrain Base [basemap]. Scale Range: 1:591,657,528 down to 1:72,224. Esri, USGS, NOAA. Updated 9 February 2017. Available at:

http://www.arcgis.com/home/item.html?id=c61ad8ab017d49e1a82f580ee1298931 [8 December 2017].

Gillett, J. M. 1972. Taxonomy of *Trifolium* (Leguminosae). IV. The American species of section Lupinaster (Adanson) Seringe. *Canadian Journal of Botany* 50(10): 1975-2007.

Green, K. and A. E. Sims. 2018. Assessing rarity status of the newly described Shasta County endemic, *Adiantum shastense* (Pteridaceae), by employing innovative tools in geographic information systems. Rare Plant Program, California Native Plant Society. Presented in Scientific Poster session of CNPS 2018 Conservation Conference, Los Angeles, CA, 1-3 February 2018.

[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. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Website http://explorer.natureserve.org [accessed 22 January 2018].

[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].

[OGTR] Office of the Gene Technology Regulator. 2008. The biology of *Trifolium repens* L. (White Clover). Australian Government, Dept. of Health and Ageing. Available at: http://www.ogtr.gov.au [accessed 27 September 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].

Palmer-Jones, T., I. W. Forster, and P. G. Clinch. 1966. Observations on the pollination of Montgomery red clover (*Trifolium pratense* L.). *New Zealand Journal of Agricultural Research* 9(3):738-747.

Tropicos. 2018. Missouri Botanical Garden. Website http://www.tropicos.org [accessed 22 January 2018].

[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. 2018. PLANTS Database. Website http://plants.usda.gov/ [accessed 22 January 2018].

Vincent, M. A. and D. Isely. 2018. *Trifolium*. *In:* Jepson Flora Project (eds.), *Jepson eFlora*. Website http://ucjeps.berkeley.edu/eflora/.

Persons Contacted:

Carlberg, T. 2017. USDA Forest Service, Six-Rivers National Forest; President, California Lichen Society. Information submitted at Mendocino/Six Rivers FS-SCC and Important Plant Areas (IPA) Workshop, Loleta, CA. Contacted 16-18 November 2017.

Goldsworthy, E. 2017. Botanist, Green Diamond Resource Company, Arcata, CA. Information submitted at Mendocino/Six Rivers FS-SCC and Important Plant Areas (IPA) Workshop, Eureka, CA. Contacted 16-18 November 2017.

Hoover, L., J. McRae, and S. Carothers. 2017. Hoover and McRae: Forest Botanists, Six Rivers NF, Eureka, CA; Carothers: Botanical Contractor, Arcata, CA. Information submitted at Mendocino/Six Rivers FS-SCC and Important Plant Areas (IPA) Workshop, Loleta, CA. Contacted 16-18 November 2017.

O'Connell, G., G. Lester, D. York, B. Clare, G. Laural, P. Clint. 2017. California North Coast botanists. Information submitted at Mendocino/Six Rivers FS-SCC and Important Plant Areas (IPA) Workshop, Loleta, CA. Contacted 16-18 November 2017.

Taylor, D. Wm. 2017. Environmental contractor, Aptos, CA. Information submitted at Mendocino/Six Rivers FS-SCC and Important Plant Areas (IPA) Workshop, Eureka, CA. Contacted 16-18 November 2017.

Author(s) and Date:

Steven Serkanic, Assistant Rare Plant Botanist, California Native Plant Society, (916) 447-2677 x218, sserkanic@cnps.org;

Aaron E. Sims, Rare Plant Botanist, California Native Plant Society, (916) 324-3816, asims@cnps.org. September 6, 2018.

Reviewer(s) and Date:

David Magney, Rare Plant Program Manager, California Native Plant Society, (916) 447-2677 ext. 205, dmagney@cnps.org. September 6, 2018.

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.