Species: *Heteranthera dubia* (Jacq.) MacMill., water star-grass

Photo Source: iNaturalist 2023

Photo Credits: Left: Sebastian V. (CC-BY-NC); top right: Laura Gaudette (CC-BY); bottom right: Adam Schneider (CC-BY-NC).

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 water star-grass

Entity	Status	Status Definition
NatureServe CA[a]	G5, S2	**G5**: Demonstrably 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 state.
California Rare Plant Rank[b]	2B.2	**2B**: Rare and endangered in California, more common elsewhere.

		0.2: Moderately threatened in California (20-80% of occurrences threatened / moderate degree and immediacy of threat). This taxon was added to the *CNPS Inventory of Rare and Endangered Plants of California* in 2013 and has undergone no subsequent changes (CNPS 2023).
California State Listing[c]	Not listed	
USDA Forest Service[d]	Not listed	
USDI FWS[e]	Not listed	
USDI BLM[f]	Not listed	
NatureServe OR[g]	Not listed	
Oregon State Listing[h]	Not listed	
NatureServe NV[i]	Not present	
Nevada State Listing[j]	Not present	

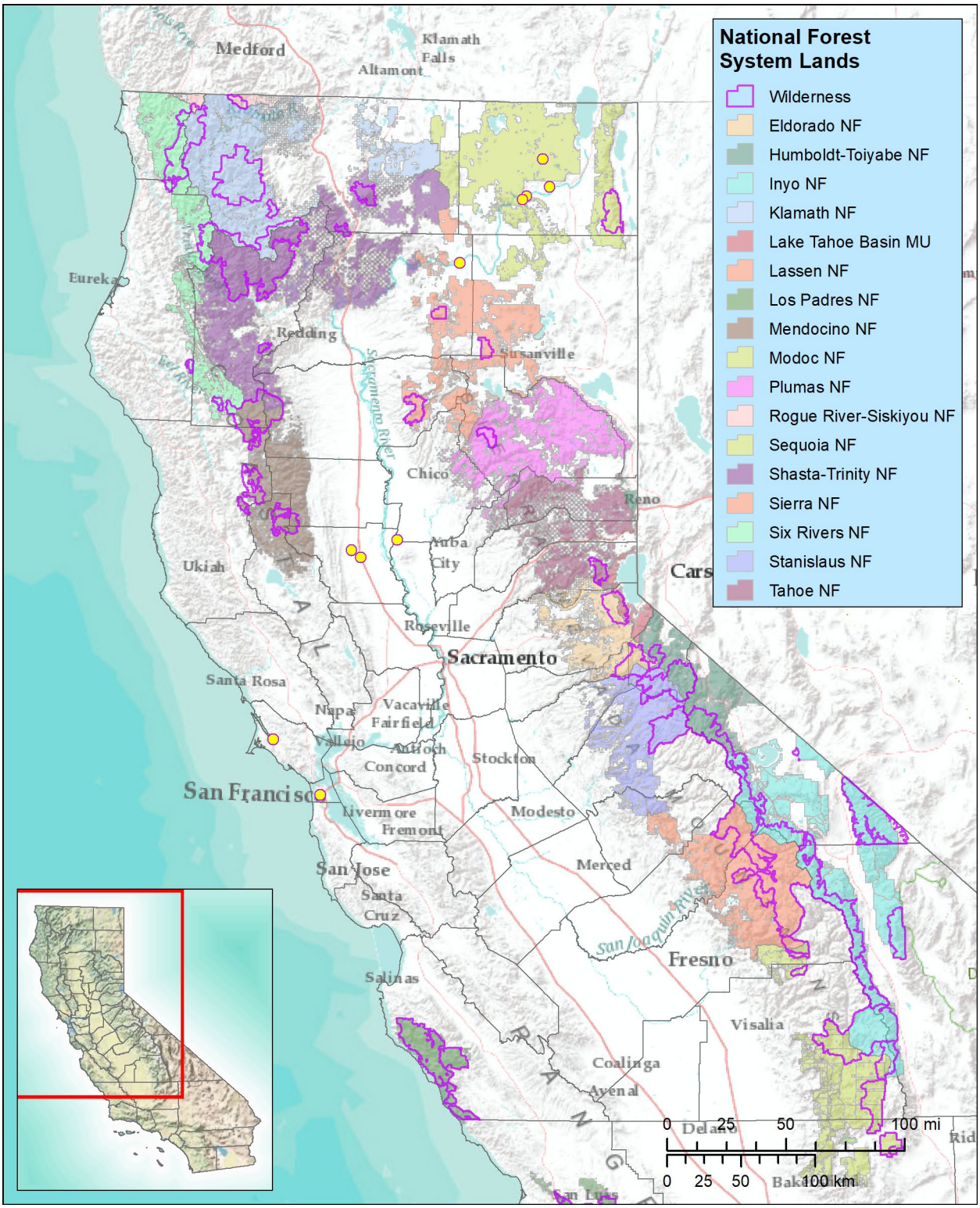
[a] California Natural Diversity Database, California Dept. of Fish & Wildlife [CNDDB 2023, 2023a]
[b] California Native Plant Society [CNPS 2023]
[c] California Department of Fish and Wildlife [CDFW 2023]
[d] US Forest Service Region 5 Forester's List [USDA 2013] and Pacific NW Survey and Manage [USDA & BLM 2014]
[e] US Department of Interior Fish and Wildlife Service [USFWS 2023]
[f] US Department of Interior Bureau of Land Management [BLM 2022]
[g] Oregon Biodiversity Information Center [ORBIC 2023]
[h] Oregon Department of Agriculture [ODA 2018]
[i] Nevada Division of Natural Heritage [NDNH 2022]
[j] Nevada Division of Forestry [NDF 2012]
Note: Individual State Heritage Programs (CNDDB, 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 unit[1]

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 CNDDB.

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

Table 2. Known occurrence frequency of water star-grass within the planning area (NRIS, CNDDB, Calflora/CCH databases)							
National Forest System (NFS) lands in California	**Record #s (from Table 4)**	**CNDDB EOs**	**Non-CNDDB Records**	**Recent (seen in past 20 years)**	**Historical (not seen in past 20 years)**	**Most Recent Obs. Date**	**Total Records on NFS lands**
Modoc:	8	1	0	0	1	3-Jul-1979	1
Totals:	N/A	1	0	0	1	N/A	1



Sources: *Distribution*: Calflora 2023, CCH2 2023, CNDDB 2023, Green 2023 pers. comm. *Baselayers*: 2013 National Geographic Society, i-cubed, Esri, Garmin, NOAA, NPS, USGS.

Water star-grass was last updated in the CNDDB on 6 December 2013 (CNDDB 2023), and therefore all Calflora, CCH, and/or NRIS records prior to this date are assumed to have already been reviewed and entered into the CNDDB 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.

Water star-grass occurs in Canada, the United States, Mexico, Guatemala, and Cuba (FNA 1993+, POWO 2023). Within California, it occurs in the Modoc Plateau (MP), Sacramento Valley (ScV), and Central Coast (CCo) bioregions in Butte, Colusa, Marin, Modoc, San Francisco, and Shasta counties (Calflora 2023, CCH2 2023, CNDDB 2023, Green 2023 pers. comm., JEPS 2023). One record (#8) is on U.S. National Forest lands on the Modoc NF. Record #7 extends further downstream than currently mapped by the CNDDB (Green 2023 pers. comm.), and while portions of this record may be on Modoc NF lands (Bainbridge 2017), the extent of the occurrence needs to be confirmed. None of the records are in designated Wilderness Areas. One of the records (#2) is in the Golden Gate NRA, and the eight remaining records (including #7) are on lands of private or unknown ownership. Eight of the records are historical (not visited in over 20 years); the other two are recent, having been observed since 2003. Seven of the records are based on single observations or collections from 28 to 147 years ago. Two of the historical locations (record #s 6 and 8) were revisited in July of 2012, and no plants were found at either site (Slakey et al. 2013). Of the three records with multiple visits, one was documented over two years and the other two over periods of 17 and 74 years, respectively. Water star-grass is an aquatic species that can root at its nodes and grows in dense tangled mats that are often submerged; therefore, the number of individuals present is difficult or impossible to determine. Record #7 is the only location with census data; in 2014, observers estimated that over 10,000 plants were present along a four-mile stretch of the Pit River (Green 2023 pers. comm.).

Of the ten records treated in this analysis, nine are already included in the CNDDB. The non-CNDDB record is approximately 3.8 miles from an existing occurrence and should perhaps be evaluated for inclusion in the CNDDB. One herbarium specimen (*Vasey s.n.*, US) with a locality of "Mendocino County" has a location uncertainty of nearly 8,000 square miles and was therefore excluded from this analysis. This record is highlighted in pink at the end of Table 4. Unless also cited in Calflora and unobscured, iNaturalist (2023) records are not included in Table 4, because they have obscured coordinates or uncertain identification.

Brief description of natural history and key ecological functions[2]

Water star-grass is an aquatic perennial herb that can be fully submerged or emergent (Horn 1983, FNA 1993+). It has tangled stems up to 2.2 m in length and linear leaves that are 2–10 cm long and 1–5 mm wide, with leaves on submerged plants being longer and wider than leaves on emergent plants (Horn 1983, FNA 1993+, CNPS 2023, JEPS 2023). Deeply submerged plants bear only cleistogamous flowers, while those growing in shallow water or on mudflats produce open yellow flowers (Wylie 1912, FNA 1993+, JEPS 2023). The flowering period is June to

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

October (Calflora 2023, CCH2 2023, CNDDB 2023, CNPS 2023). Within California, water star-grass is found in ponds, lakes, or slow-moving streams, rivers, or drainage canals at elevations ranging from 50 to 4,905 feet (15 to 1,495 meters) (Calflora 2023, CCH2 2023, CNDDB 2023, CNPS 2023, Green 2023 pers. comm.). One record (#8) was in vernally wet depressions (CCH2 2023, CNDDB 2023). Water depth for the California records is not reported, but elsewhere in the United States the species has been observed on wet mudflats at the water's edge as well as to depths of nearly five meters (Sheldon and Boylen 1977, Horn 1983, Madsen et al. 1996). Water star-grass is generally found in basic waters with pH 7.24–9.12 with an average pH of 8.3–8.4 (Moyle 1945, FNA 1993+, Harms 2010). Optimal growth was observed in Minnesota lakes that ranged from pH 8.0–8.8 (Moyle 1945). One California record includes the associated species *Lemna turionifera*, *Myriophyllum sibiricum*, *Potamogeton richardsonii*, and *P. nodosus* (Green 2023 pers. comm.). Associates reported in Oregon include *Ceratophyllum demersum*, *Elodea canadensis*, *E. nuttallii*, *Myriophyllum spicatum*, seven species of *Potamogeton*, *Schoenoplectus acutus*, *Stuckenia pectinata*, and *Typha latifolia* (CPNWH 2023).

Heteranthera contains from 12 to 20 species distributed in the Western Hemisphere and Africa (FNA 1993+, POWO 2023). Three species are known from California: water star-grass, *Heteranthera limosa*, and *H. rotundifolia* (FNA 1993+, JEPS 2023). *Heteranthera limosa* and *H. rotundifolia* are two non-native taxa that have been considered conspecific in some treatments (FNA 1993+, JEPS 2023). *Heteranthera limosa* is a naturalized weed of rice fields and other aquatic habitats in the Sacramento Valley (JEPS 2023). Water star-grass is distinguished from *H. limosa* by its linear, sessile, alternate leaves (vs. ovate, petiolate leaves in a basal rosette), slender, spreading, many-branched and often tangled stems (vs. stout, erect, often tufted, rarely tangled), and sessile yellow flowers (vs. peduncled white to blue-purple flowers) (JEPS 2023). *Heteranthera rotundifolia* is currently treated as an agricultural waif in California with a range and ecology like that of *H. limosa* (JEPS 2023); it can be separated from water star-grass using similar characters. Water star-grass and some species of *Potamogeton* are very similar in their vegetative appearance; water star-grass can be separated from vegetative *Potamogeton* spp. by its branched (vs. unbranched) roots, lack of petioles and leaf midveins (vs. distinct midvein), and lack of floating leaves (vs. floating leaves often present) (Horn 1983, JEPS 2023).

Submerged flowers of water star-grass are cleistogamous, with pollination effected by stigma elongation past mature anthers (Wylie 1912, Horn 1983). Plants in shallow water or on mudflats bear chasmogamous flowers that open in the morning and wilt by the end of the day (Wylie 1912, Horn 1983, FNA 1993+, JEPS 2023). While no pollinator records were found for any *Heteranthera* species, emergent flowers of other Pontederiaceae taxa are pollinated by bees, butterflies, and moths (CPC 2023). Most seeds are produced by cleistogamous flowers (Horn 1983). Water star-grass capsules contain from 7 to 30 many-winged seeds that are 1 to 1.6 mm long (Horn 1983, FNA 1993+). At least some of the seeds sink to the bottom and overwinter in the substrate (Horn 1983). Water star-grass stems can root at nodes, and vegetative reproduction is common during the growing season (Horn 1983).

Overview of ecological conditions for recovery, conservation, and viability[3] including Threats and Risk Factors

Water star-grass is currently known from ten occurrences in California, only one of which has a site quality ranking (ranked Excellent) (CNDDB 2023, Green 2023 pers. comm.). Most of the California occurrences (80%) are historical, and the species may be extirpated from some of these sites. Elsewhere in the United States, water star-grass is possibly extirpated (SH) from one state, critically imperiled (S1) in five states, imperiled (S2) in four states, and vulnerable (S3) in four states (NatureServe 2023). In Canada, it is imperiled in one province and vulnerable in two others (NatureServe 2023).

Threats to water star-grass include runoff from grazing land and recreational boating (Bainbridge 2017, CNDDB 2023, CNPS 2023, Green 2023 pers. comm.). Additional threats include alteration or elimination of aquatic habitats that water star-grass requires, whether through development, water diversion, or other causes. The populations in California are isolated and may be at risk of local extirpation due to drought or other environmental perturbations (Shaffer 1981).

While water star-grass is not afforded special protections on National Forest or National Recreation Area lands, its aquatic habitats on these public lands are protected from many sources of potential disturbance. There are no *ex-situ* living collections or seed collections, and water star-grass is not a current target for the California Plant Rescue initiative (CaPR 2023).

Taxonomy[4]

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

Table 3. Name status of water star-grass

Entity	Name Status
CNDDB and CNPS	*Heteranthera dubia* (Jacq.) MacMill.
Jepson eFlora	*Heteranthera dubia* (Jacq.) MacMill.
Jepson Manual (1993)	*Heteranthera dubia* (Jacq.) MacMill.
Flora of North America	*Heteranthera dubia* (Jacquin) MacMillan
USDA NRCS[a] PLANTS	*Heteranthera dubia* (Jacq.) MacMill.

[a] Natural Resources Conservation Service [NRCS 2023]

Synonymy: *Commelina dubia* Jacq., *Phrynium dubium* (Jacq.) Farw., *Schollera dubia* (Jacq.) Kuntze, *Zosterella dubia* (Jacq.) Small, *Heteranthera dubia* (Jacq.) Morong, *Heteranthera dubia* f. *terrestre* (Farw.) Vict., *Heteranthera graminea* (Michx.) Vahl, *Heteranthera liebmannii* (Buchenau) Shinners, *Leptanthus gramineus* Michx., *Phrynium dubium* (Jacq.) Farw., *Phrynium dubium* var. *terrestre* Farw., *Schollera dubia* (Jacq.) Kuntze, *Schollera graminea* (Michx.) Willd.

[3] 1909.12 Chapter 10, Section 12.53, components 7, 9, 10, 11 and 12, as appropriate.
[4] 1909.12, Chapter 10, Section 12.53, component 1.

ex A. Gray, *Schollera graminea* (Michx.) Raf., *Schollera graminea* var. *minima* N. Coleman, *Schollera graminifolia* Willd., *Zosterella dubia* (Jacq.) Small, *Zosterella longituba* Alexander, *Potamogeton liebmannii* Buchenau (Tropicos 2023, POWO 2023).

Jepson eFlora link (JEPS 2023): https://ucjeps.berkeley.edu/eflora/eflora_display.php?tid=28058

Type locality: United States, Virginia, "…haud procul a montibus in rivulo Jacobi dieto…" [not far from the mountains in the James River] (*Clayton 814*, BM) (Jacquin 1768, Tropicos 2023).

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Persons Contacted

Green, Kaitlyn. 2023. Data Coordinator, California Native Plant Society. Email correspondence regarding recent/unprocessed survey forms for *Heteranthera dubia*. Personal communication 25 July 2023.

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Adam J. Searcy, California Native Plant Society, Rare Plant Scientific Coordinator, 14 August 2023

Reviewer(s) and Date:

Ellen A. Dean, California Native Plant Society, Rare Plant Botanist, 7 August 2023; R. Douglas Stone, California Native Plant Society, Associate Rare Plant Botanist, 7 August 2023

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 water star-grass within California (NRIS, CNDDB, 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 pink.

Rec. #	Locality	County	Quad	Ref. (Source)	Date Last Obs'd	Population Info	Threats	Land Mgr.	Elev. (ft.)
1	NEAR SAN FRANCISCO.	San Francisco	San Francisco North (3712274)	CNDDB, Jul. 2023 (EO 1)	1876	ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS AN 1876 COLLECTION BY VASEY. NEEDS FIELDWORK.		Unknown	Unknown
1	near San Francisco ?	San Francisco		CCH2, Jul. 2023 (GH barcode-01919066)	1876				
2	2 PONDS ON THE BAY SIDE OF TOMALES, CLOSE TO HIGHWAY 1 JUST NORTH OF POINT REYES STATION.	Marin	Inverness (3812217)	CNDDB, Jul. 2023 (EO 2)	mid-1990s	UNKNOWN NUMBER OF PLANTS SEEN BY BARR SOMETIME IN THE MID 1990S. 2 LITTLE PONDS.		Golden Gate NRA	80
3	BUTTE SINK, BUTTE COUNTY.	Butte	Sanborn Slough (3912138)	CNDDB, Jul. 2023 (EO 3)	14-Aug-1946	ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1946 COLLECTION BY MASON. NEEDS FIELDWORK.		Unknown	55
3	Butte Sink	Butte	Pennington (3912137)	CCH2, Jul. 2023 (UC1100978)	14-Aug-1946				

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
4	3 MILES NORTH OF WILLIAMS, GLENN-COLUSA CANAL IRRIGATION DISTRICT.	Colusa	Williams (3912222)	CNDDB, Jul. 2023 (EO 4)	Oct-1976	OCCURRENCE IS BASED ON A 1976 COLLECTION BY YEO. VICINITY SEARCHED BY TAYLOR IN 2013; NO PLANTS FOUND, BUT TAYLOR BELIEVES THAT HETERANTHERA MAY STILL BE PRESENT.		Unknown	75
4	3 mi N of Williams, Glenn-Colusa Canal irrigation district	Colusa	Williams (3912222)	CCH2, Jul. 2023 (UCR-BPS-141657)	Oct-1976				79
4	3 mi N of Williams, Glenn-Colusa Canal irrigation district	Colusa	Maxwell (3912232)	CCH2, Jul. 2023 (SBBG115923)	Oct-1976				
5	HIGHWAY 299 BETWEEN CANBY AND ALTURAS.	Modoc	Rattlesnake Butte (4112046)	CNDDB, Jul. 2023 (EO 5)	17-Jun-1949	ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1949 COLLECTION BY NOBS. NEEDS FIELDWORK.		Unknown	
5	Hwy 99 between Canby and Alturas	Modoc		CCH2, Jul. 2023 (UC1100982)	17-Jun-1949	Flowering/Fruiting			

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
6	PIT RIVER, ABOUT 2 MILES DOWNSTREAM FROM CANBY.	Modoc	Washington Mtn. (4112048)	CNDDB, Jul. 2023 (EO 6)	28-Aug-1947	ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1947 COLLECTION BY GRANT. PIT RIVER SURVEYED BY KEELAN FROM CENTERVILLE RD DOWNSTREAM TO SHORTLY BEFORE THE NARROWS IN 2010; NO PLANTS FOUND, THOUGH HABITAT LOOKED SUITABLE.	THREATENED BY RUNOFF FROM GRAZED AREA. ARTIFICIAL DAMS PRESENT, BUT THESE MAY ACTUALLY BE BENEFICIAL FOR HABITAT.	Unknown	4200
6	below Canby; Pit River	Modoc		CCH2, Jul. 2023 (UC1055935)	14-Aug-1955	Flowering/Fruiting			
6	about 2 mi downstream from Canby; Pit River	Modoc		CCH2, Jul. 2023 (UC1100977)	28-Aug-1947	Flowering/Fruiting			
6	near Canby Pit R.	Modoc		CCH2, Jul. 2023 (UC1536816)	19-Jul-1939	Vegetative (non-reproductive)			

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
7	CANBY BRIDGE, WHERE HIGHWAY 299 CROSSES THE PIT RIVER, APPROXIMATELY 4 AIR MILES SOUTHWEST OF CANBY.	Modoc	Washington Mtn. (4112048)	CNDDB, Jul. 2023 (EO 7)	3-Jul-2007	MAIN SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 2007 COLLECTION BY CLIFTON, PLANTS NOTED TO BE "DOING QUITE WELL." A 1947 COLLECTION BY GRANT FROM "PIT RIVER, ~3.5 MI DOWNSTREAM FROM CANBY, AT ENTRANCE OF GORGE" IS ALSO ATTRIBUTED HERE. VOLCANIC SOIL.		Private; portions of this occurrence may be on Modoc NF	4250
7		Modoc	Washington Mountain (4112048)	Calflora, Jul. 2023 (wb2234-502)	1-Aug-2020				4265

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
7	Pit River from Rte 299 bridge downstream each place we spot-checked for about 4 miles (to at least 41.41545, -120.99065). Farthest upstream (bridge): 41.40171, -120.93159. Easy access from gravel lot: 41.40000, -120.93478. Farther downstream at 41.40194, -120.94730 (1 mile); 41.41021, -120.98004 (3 mi); and 41.41545, -120.99065 (4 mi).	Modoc		Green 2023 pers. comm. (unprocessed CNDDB form KEE14F0010)	11-Jul-2014	Over 10,000 plants. 99+% veg 0.1% flowering. Shallow water of the Pit River, growing both in faster-moving riffles and in sluggish sections. Most closely associated with Elodea (probably E. nuttallii) and Lemna turionifera. Also occasional Myriophyllum sibiricum, Potamogeton richardsonii, P. nodosus, and a single flowering plant of Alisma gramineum (ranked 2B.2, S shore 200 feet west of bridge at 41.40143, -120.93241).	Potentially if changes in management practices of properties upstream, or change of ownership of the Bushey ranchland.	Private	4280
7	Pit R, at gravel lot SW of bridge -- Rte 299, 4 air mi SW of Canby	Modoc	Washington Mountain (4112048)	Calflora, Jul. 2023 (wb1337-154)	11-Jul-2014			Private	4272
7	Pit River, ca. 3.5 mi. downstream from Canby, at entrance of gorge.	Modoc	Washington Mountain (4112048)	CCH2, Jul. 2023 (CAS242203)	28-Aug-1947				
7	ca. 3 1/2 mi downstream from Canby (at entrance to gorge); Pit River	Modoc	Washington Mountain (4112048)	CCH2, Jul. 2023 (UC1100976)	28-Aug-1947				

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
8	TRIANGLE, ANTELOPE PLAINS UNIT, DEVILS GARDEN DISTRICT, MODOC NATIONAL FOREST.	Modoc	Boles Meadows East (4112067)	CNDDB, Jul. 2023 (EO 8)	3-Jul-1979	ONLY SOURCE OF INFORMATION IS A 1979 COLLECTION BY SAVAGE. RESERVOIR C, JOE SWEET POND, AND DRYING AREAS 0.5 MI SE OF JOE SWEET POND SEARCHED IN 2012; NO PLANTS FOUND. RESERVOIR C WOULD BE WORTH CHECKING AGAIN, OTHER AREAS CAN BE RULED OUT. DESICCATING MOIST OR WET DEPRESSIONS VERNALLY WHERE WATER HAS STOOD; REDDISH SOILS OF STONY LOAM DERIVED FROM VOLCANICS ON TOP OF HARD-PAN. ASSOCIATED WITH JUNIPERUS OCCIDENTALIS AND ARTEMISIA CANA.	POSSIBLY DISTURBED BY RECREATIONAL BOATING ON RESERVOIR C.	Modoc NF	4950
8	Triangle, Antelope Plains Unit, Devils Garden District, Modoc National Forest	Modoc		CCH2, Jul. 2023 (SJSU9369)	3-Jul-1979	desiccating moist or wet depressions vernally where water has stood; reddish soils of stony loam derived from volcanics on top of hard-pan assoc with Juniperus occidentalis & Artemisia cana			

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
9	FALL RIVER MILLS, PIT RIVER.	Shasta	Fall River Mills (4112114)	CNDDB, Jul. 2023 (EO 9)	14-Aug-1955	ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS A 1955 COLLECTION BY MASON. NEEDS FIELDWORK.		Unknown	
9	Fall River Mills Pit River	Shasta	Fall River Mills (4112114)	CCH2, Jul. 2023 (UC1055934)	14-Aug-1955				
10	3.5 miles southwest of Maxwell; eastern bank of the Glenn-Colusa Canal downstream of the crossing of Fairview Road.; Williams	Colusa	Williams (3912222)	CCH2, Jul. 2023 (RSA0069334)	18-May-2014	Shallow water of the unlined irrigation canal.		Unknown	118
10	3.5 miles southwest of Maxwell; eastern bank of the Glenn-Colusa Canal downstream of the crossing of Fairview Road; Williams, CA	Colusa	Williams (3912222)	CCH2, Jul. 2023 (RSA0049696)	18-May-2014	Shallow water of the unlined irrigation canal			118

Duplicate records from the same site are given the same record number and are included in red. Rows containing questionable records are highlighted in pink.									
Rec. #	**Locality**	**County**	**Quad**	**Ref. (Source)**	**Date Last Obs'd**	**Population Info**	**Threats**	**Land Mgr.**	**Elev. (ft.)**
10	3.5 miles southwest of Maxwell; eastern bank of the Glenn-Colusa Canal downstream of the crossing of Fairview Road. T16N R03W S18 USGS Quadrangle: Williams, CA 1:24,000	Colusa	Williams (3912222)	CCH2, Jul. 2023 (CHSC118362)	18-May-2014	Shallow water of the unlined irrigation canal.			118
10	3.5 miles southwest of Maxwell; eastern bank of the Glenn-Colusa Canal downstream of the crossing of Fairview Road.; Williams	Colusa	Williams (3912222)	CCH2, Jul. 2023 (RSA0089768)	18-May-2014	Shallow water of the unlined irrigation canal.			118
10	3.5 miles southwest of Maxwell; eastern bank of the Glenn-Colusa Canal downstream of the crossing of Fairview Road	Colusa	Williams (3912222)	Calflora, Jul. 2023 (oe6739)	6-Sep-2013	shallow water			118
	Mendocino Co.	Mendocino		CCH2, Jul. 2023 (US 33085)	1875			Unknown	

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.>