Plant Species Evaluation Form

Calochortus longebarbatus (Wats.) **var.** *longebarbatus*

LONG-HAIRED STAR-TULIP

Family: Liliaceae (CNPS 2018) | **PLANTS Symbol:** CALOL (USDA 2018) | **Calif. Endemic:** No (CNPS 2018)

Synonyms/Other Names: No synonyms or other names are known to have been used for this taxon

Identification Issues: *Calochortus* spp. are considered difficult to key (Fiedler 2017). Variation in petal shape, gland shape, and pubescence is noteworthy and useful for identification (Fiedler and Zebell 2017).

Taxonomy:

Species In Genus: +- 67 species: western North America, Central America; many cultivated. Etymology: (Greek: beautiful grass) Note: Bulbs of some eaten by Native Americans. Many taxa variable, difficult to key.

Genus Description: Habit: Bulb coat generally membranous, occasionally fibrous. Stem: scapose or leafy, generally erect, generally branched, bulblets in axils of lower leaves or 0. Leaf: generally linear to lanceolate; basal leaf 1, persistent or not; cauline leaves 0--several, occasionally appearing basal, generally smaller upward, withering or not. Inflorescence: often +- umbel-like; flowers 2--many; bracts 0--several, generally opposite, often paired. Flower: perianth +- closed, spheric to oblong, or open, bell-shaped or +- rotate; sepals generally < petals, generally +- lanceolate (ovate), generally +- glabrous; petals generally widely wedge-shaped, occasionally clawed, generally hairy adaxially, nectary near base; stamens 6, filaments +- flat, often dilated at base, anthers generally attached at base or appearing so; style 1, stigmas 3. Fruit: capsule, septicidal; oblong or linear, generally 3-angled or -winged, chambers 3. Seed: many in 2 rows per chamber, flat, generally +- tan or +- yellow, translucent, or irregular dark brown, often net-like.

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capsule, septicidal; oblong or linear, generally 3-angled or -winged, chambers 3. Seed: many in 2 rows per chamber, flat, generally +- tan or +- yellow, translucent, or irregular dark brown, often net-like.

Status:

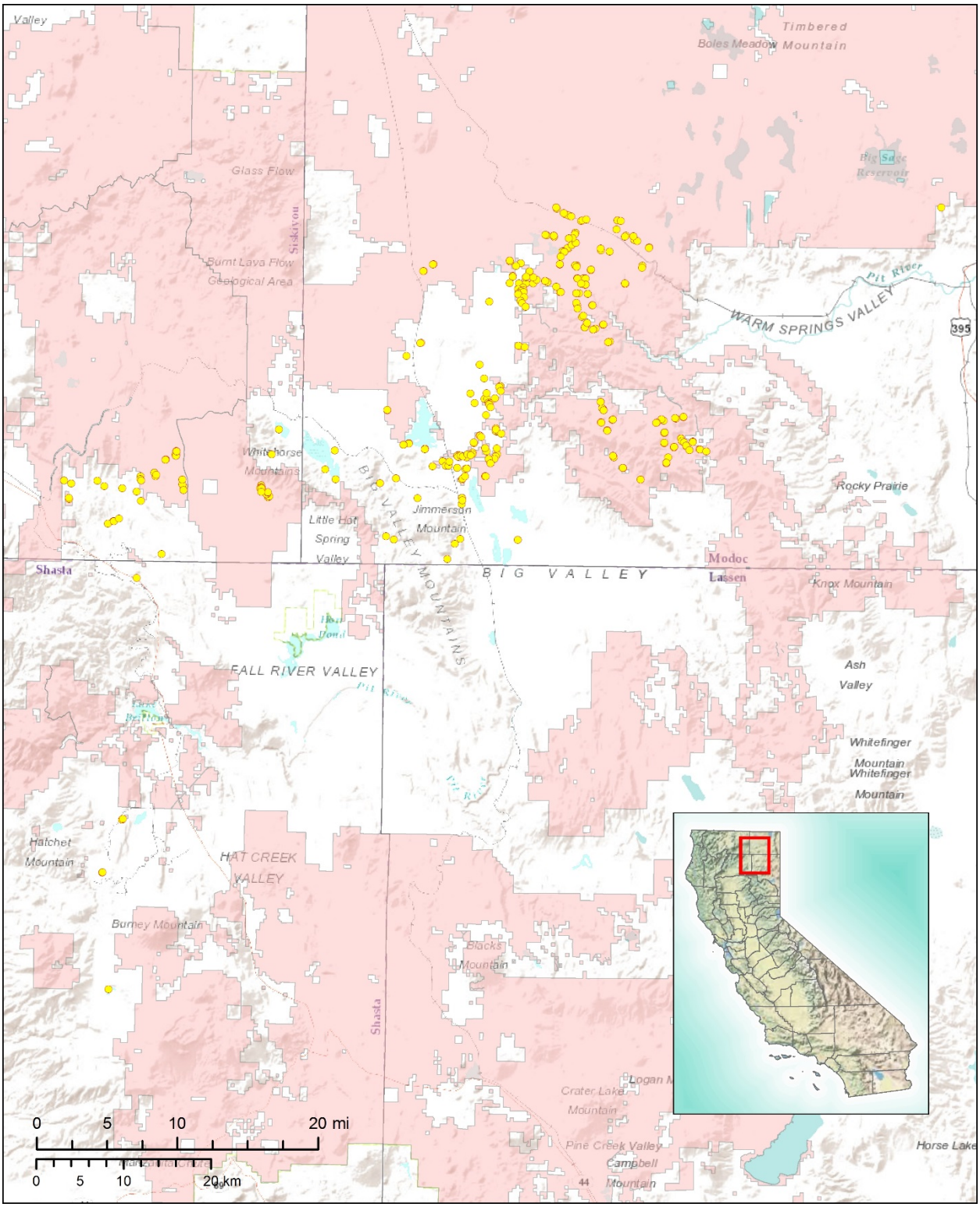
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G4T3	CA: S3 NV: Not listed OR: S3	1B.2	Sensitive	Not listed	Sensitive

SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Not listed	4: Watch list	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 Oregon, Washington, and California (Fiedler and Zebell 2017). California occurrences are restricted to northeastern counties (Modoc, Shasta, and Siskiyou counties). A total of 83 occurrences are found on NFS lands. Roughly 86% (71/83) of these occurrences are within Modoc NF. Just over 6% (5/83) are found on Lassen NF, and roughly 8% (7/83) are on Shasta-Trinity NF (CNDDB 2017; NRIS 2017; CCH 2017; Calflora 2017). A single record from Santa Barbara County (Calflora 2017) was omitted from the preceding summary due to its considerable distance, improbable location and habitat, and likelihood for misidentification (Calflora 2017).



Map Sources: *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:

(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.)

REDACTED FOR CONSERVATION PURPOSES

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:	-	-	-	-	-	-	-	0
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	8,15,50,58,80	5	0	3	2	3-Jul-2008	11	5
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	2,3,4,5,6,7,16,20,22,23,24,25,26,27,28,29,31,32,33,34,35,37,38,39,41,42,43,44,46,47,48,49,51,52,53,54,55,56,57,59,60,61,62,63,64,65,66,67,68,70,71,72,73,74,75,76,77,78,79,82,83,84,85,86,87,90,91,95,101,105,110	71	0	20	51	25-Jun-2012	39	71
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0

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
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	9,10,11,12,13,14,18,	7	0	1	6	5-Aug-2010	10	7
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	-	-	-	-	-	-	-	0
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	83	0	24	59	N/A	60	83

Demographic and Population Trends: *Calochortus* spp. are seasonally dormant and can remain dormant during the growing season. When conducting surveys, it is important to consider that visible population size does not always equate to actual population size (Miller et al. 2004). A majority of the 129 occurrences have population count and size estimate information. Many of these occurrences have observation estimates with 1,000's of individuals. A single occurrence (EO 97) was estimated to have 71,000 plants at the time of its observation. A large number of occurrences have limited numbers of plants and are known from estimates that range between 1 and 20 individuals. Some occurrences with repeat and periodic observation estimates report up to 10-fold differences in population sizes between visits (e.g. EO 88, with 105 estimated plants in 1990 and 1,080 estimated plants in 1996). Most sites with repeat and periodic visits have an approximated variance of 1-2 times the average value of all observation estimates for a given occurrence (CNDDB 2017; NRIS 2017; CCH 2017; Calflora 2017).

Life History: *Calochortus longebarbatus* var. *longebarbatus* is an herbaceous perennial and bulb forming monocot. This species has a prominent, open, trimerous perianth with spreading, glabrous petals (star tulip-type). It emerges and blooms during the months of June through August (CNPS 2018). *Calochortus* spp. are regarded as generalist species that are visited by an assortment of pollinators. Pollen of *Calochortus* spp. are often collected by bees, and beetles are known to feed on glands at the base of petals (Dilley et al. 2000). *Calochortus* spp. are slow growing. Population persistence is of great importance to conservation of this species. Reproductive output is reliant upon the long term establishment of populations (Fiedler et al. 1998). The number of flowering plants can vary substantially between years. During a four year monitoring project on *C. longebarbatus* on the Fremont NF in Oregon, observers documented a ten-fold fluctuation in the number of flowering plants, between years, over the course of the investigation (Wooley 2001).

Diversity: The genus *Calochortus* Pursh contains 70 species and is primarily distributed in western North America. Certain taxa can be found in Central America, but a bulk of the diversity is located to the north, in areas with a temperate climate (Fiedler and Zebell 2017). Patterson and Givnish (2003) inferred that *Calochortus* arose roughly 7 million years ago in the Coast Ranges of California. Clades within their phylogeny demonstrate a considerable degree of geographic structure, indicating local adaptation to distinct growing conditions. They concluded this geographic structure and clustered species distribution is a due to limited dispersal as a function of many taxa having heavy seeds and fruit that lack adaptations to long-distance dispersal.

There are four prominent floral syndromes among species in the genus *Calochortus* Pursh (fairy lantern, star tulip, cat's ear, and mariposa). *Calochortus longebarbatus* var. *longebarbatus* is a taxon that demonstrates the star tulip type floral syndrome. Clades containing taxa with the star tulip floral syndrome are inferred to have arisen twice within the genus (Patterson and Givnish 2003).

Habitat: *Calochortus longebarbatus* var. *longebarbatus* often occurs in seasonally wet meadows with mesic conditions among openings in lower montane coniferous forests or Great Basin scrub (CNPS 2018). Many records indicate that *C. longebarbatus* var. *longebarbatus* associates with *Camassia quamash, Polygonum bistortoides, Pinus jeffreyi, P. ponderosa, P. contorta, Abies concolor, Artemisia arbuscula, Geum ciliatum, Brodiaea coronaria, Triteleia hyacinthina, Perideridia kelloggii, Downingia* sp., *Achillea millefolium, Thermopsis macrophylla, Arnica fulgens*, and *Juniperus occidentalis* (CNDDB 2017).

Habitat Status or Trend: One particular site on Lassen NF is a grazed meadow that has issues with invasive plants (Sanger et al. pers. comm. 2017). Approximately 82 occurrences in the California Natural Diversity Database (CNDDB 2017) indicate grazing as a threat to *C. longebarbatus* var. *longebarbatus*; its preferred habitat in California therefore appears to be subject to cattle and sheep grazing as land use, which can have adverse effects on its habitat when not managed properly.

Approximately 50 CNDDB (2017) occurrences indicate that logging, adjacent logging, or the effects of logging is a threat to this taxon. Logging has changed a large proportion of montane coniferous forests, altering climate, physiography, and nutrient dynamics in some of the region where *C. longebarbatus* var. *longebarbatus* grows in California. By 1950, more than 20% of at least a portion of the region's land area where *C. longebarbatus* var. *longebarbatus* occurs had been logged at least once (Laudenslayer and Darr 1990); in the latter part of the 20th century, the forests were subject to a disturbance rate of 0.53% per year—with a disproportionate amount of the impact occurring on public lands (Staus et al. 2002). It's important to note, however, that logging for development of housing, infrastructure, or conversion to agriculture isn't really an issue in montane coniferous forests in far northern California. Forests that are logged are either reforested with young trees or they naturally revert to forests over time; the loss of old growth is permanent, but the loss of forest is temporary (J. Kierstead pers. comm. 2021). Direct effects from removal of canopy cover, together with concomitant impacts of disturbance, may pose a significant threat to *C. longebarbatus* var. *longebarbatus*'s habitat; however, while disturbance is

an issue, *C. longebarbatus* var. *longebarbatus* is not a forest speacies needing tree canopy cover (J. Kierstead pers. comm. 2021).

Capacity for the Species to Disperse: *Calochortus* spp. have relatively heavy seeds that are unconducive to long-distance dispersal. Restricted dispersal is considered a contributor to local adaptation, group wide species richness, and evolution in situ (Patterson & Givnish 2004).

Threats: Considerable horticultural interest exists among species in the genus *Calochortus*. Rare taxa like *C. longebarbatus* var. *longebarbatus* are subject to collecting (CNPS 2018). Many occurrences have a limited number of plants, and are threatened by grazing, logging, development, and vehicle activity (CNPS 2018). *Calochortus* spp. are long living and slow growing herbaceous perennials that rely on persistent populations for seedling recruitment. Vertebrate herbivores, including livestock, threaten these species that rely on long term establishment and high survival rates for reproductive output (Fiedler et al. 1998). Grazing and invasive species impact plants on the Lassen NF (Sanger et al. pers. comm. 2017). Approximately 84 occurrences in the CNDDB (2017) indicate that grazing and/or trampling by cattle is a threat. An additional source claims that grazing is overrated as a threat except in areas with fluvial geomorphology (D. Taylor pers. comm. 2017). In addition to grazing being documented as a threat to many occurrences, approximately 50 occurrences of *C. longebarbatus* var. *longebarbatus* in the CNDDB are documented to be threatened by logging, and other threats to this taxon that are documented in the CNDDB include: off road vehicles, recreational use, road construction and maintenance, surface water diversion, and erosion/runoff. Alteration of hydrology from diversion or road building, or downcutting from intensive livestock use, can dry out the wetland habitat for this plant (J. Kierstead pers. comm. 2021).

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Reviewer(s) and Date:

Julie Ann Kierstead, USDA Forest Service Region 5 Ecosystem Planning, October 18, 2021.

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

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

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