Desert Cymopterus (*Cymopterus deserticola*)

Photo courtesy of Jasmine J. Watts

Legal Status

State: None
California Rare Plant Rank: 1B.2[1]
Federal: Bureau of Land Management Sensitive
Critical Habitat: N/A
Recovery Planning: N/A

Taxonomy

Desert cymopterus (*Cymopterus deserticola*) was originally described by Townshend Stith Brandegee in 1915 (Hall 1915, p. 168; IPNI 2005). Mathias (1930) provides a detailed description of this species, and subsequent descriptions in floras appear to be based on this work (Bagley 2006). Desert cymopterus is in the carrot family (Apiaceae) (Jepson Flora Project 2011). Desert cymopterus is a tap-rooted perennial about 15 centimeters (5.9 inches) in height. A full physical description of the species can be found in the Jepson Flora Project (2011).

Distribution

General

There are a total of 79 occurrences in the California Natural Diversity Database (CNDDB) (CDFW 2013a) all originating from 14 collections, one collection of which was a duplicate (Sanders, pers. comm. 2012) The historical distribution of desert cymopterus ranged from Apple Valley in San Bernardino County northward approximately 55 miles to the Cuddeback Lake basin in San Bernardino County, and westward approximately 45 miles to the Rogers and Buckhorn Dry Lake basins on Edwards Air Force Base in Kern and Los Angeles Counties.

[1] **1B:** Rare, threatened, or endangered in California and elsewhere; **X.2:** Fairly endangered in California.

However, the Apple Valley locations have presumably been extirpated resulting in a current distribution that includes the Rogers Dry Lake, Harper Dry Lake, Cuddeback Dry Lake, and Superior Dry Lake basins (69 FR 64884–64889; Figure SP-P06). This species occurs at elevations from 2,000 to 3,000 feet, and possibly up to 5,000 feet (69 FR 64884–64889; CNPS 2011).

Distribution and Occurrences within the Plan Area

Historical

There are three CNDDB occurrences from before 1990. Two of these are located in the vicinity of Leuhman Ridge and Kramer Hills near other occurrences of this species. One of these is possibly extirpated and located over 25 miles southeast of other occurrences east of Victorville (Figure SP-P06; CDFW 2013a).

Recent

There are a total of 230 CNDDB occurrences in the Plan Area (CDFW 2013a). Of these, there are 227 recent occurrences (status updated since 1990) that range from south of Buckhorn Lake along the Kern–Los Angeles County boundary north to the Black Hills and Fort Irwin (Figure SP-P06). However, the majority of these occurrences are located on or near Edwards Air Force Base which may be because Edwards Air Force Base is the only area in the Mojave Desert that has had extensive surveys conducted for desert cymopterus. Those on Edwards Air Force Base and the one occurrence at Fort Irwin are on lands owned by the Department of Defense (DOD). Other occurrences on public land include those managed by the Bureau of Land Management (BLM) in the general vicinity of North Edwards, Harper Lake, and Cuddeback Lake. The remaining nine recent records are either located on private land or the ownership is unknown (CDFW 2013a).

Natural History

Habitat Requirements

Desert cymopterus grows in Joshua tree woodland, saltbush scrub, and Mojavean desert scrub communities on loose, sandy soils. The

sandy soils required by this species occur on alluvial fans and basins, stabilized sand fields, and occasionally sandy slopes of desert dry lake basins (69 FR 64884–64889).

Table 1. Habitat Associations for Desert Cymopterus

Land Cover Type	Habitat Designation	Habitat Parameters	Supporting Information
Joshua tree woodland, Saltbush scrub, Mojavean desert scrub	Primary habitat	Loose, sandy soils, 2,000–5,000 feet	69 FR 64884–64889; CNPS 2011

Reproduction

As a taprooted perennial, desert cymopterus does not appear to reproduce vegetatively, but rather reproduces via seeds. Seedling establishment has not been reported for this species. Establishment of new individuals in a population may be infrequent given that many reported desert cymopterus populations are highly dispersed and low density (NatureServe 2010).

Depending on the year, desert cymopterus flowers between early March and mid-May, and may not flower at all in unfavorable years. Poor seed production or seed survival may be a factor in infrequent establishment observed in field studies. At a number of sites in several different years little or no seed production has been observed. A study conducted in 1988 at five sites found that the inflorescences dried up and aborted before setting fruit at each site (Moe 1988, cited in Bagley 2006). In a 1992 study at three sites on Edwards Air Force Base, Charlton (1993, cited in Bagley 2006) reported that only a small portion of the plants flowered and that even fewer successfully produced seed. On the other hand, in 1995, a wet El Niño year, most plants (95%) produced inflorescences at the same three sites, and 51% of the plants had set fruit near the end of the growing season (Mitchell et al. 1995, cited in NatureServe 2010). However, this still indicates a lot of inflorescences aborted before setting fruit (NatureServe 2010).

Fruits of desert cymopterus are fairly large and do not seem well adapted for dispersal over long distances. Fruits generally seem to fall

relatively close to the parent plant. The fruits have a marginal wing that may facilitate dispersal by wind. However, the wings in *C. deserticola* are reduced and appear to be thickened, which suggests that either wind dispersal is less important in this species or that the winds of the Mojave are sufficient to move seeds with poorly developed wings (Sanders, pers. comm. 2012). In addition, the fruits mature late in the season, typically after the end of the rainy season, so they remain dry and light. Therefore, given that wind is relatively common in the open sandy habitats where this species is found, it could easily push the fruits along the soil surface, although the fruits probably do not become airborne (NatureServe 2010).

Because of the annual variability in rainfall, the underground parts of herbaceous desert perennials, including desert cymopterus, must be able to maintain the populations over time with frequent years of reproductive failure; in addition, they must be able to survive prolonged periods of low soil moisture and entire years without aboveground photosynthetic activity (NatureServe 2010).

In dry years, desert cymopterus may not produce flowers or fruit and may even remain dormant underground during the usual growing season. In very wet years, however, they may produce flowers and fruits abundantly. Observations of abundant desert cymopterus in 1995 on Edwards Air Force Base demonstrated the species' ability to survive the 1988–1994 drought in large numbers and with great vigor (NatureServe 2010). Populations of desert cymopterus are probably maintained by periodic recruitment only after years of exceptionally favorable conditions for seed production (Bagley 2006; NatureServe 2010).

Ecological Relationships

Population sizes appear to vary greatly from year to year, evidently in response to the amount and timing of winter and spring rainfall, making it difficult to determine population trends (NatureServe 2010).

Population Status and Trends

Global: G2, Imperiled (NatureServe 2011, Conservation Status last reviewed 2005)
State: S2, Imperiled (CDFW 2013b)

Abundance estimates for each population are usually less than 1,000 plants. However, estimating population size is difficult for a number of reasons. First, occurrences and population size fluctuate widely from year to year in response to climatic conditions, especially on the amount of rainfall. Desert cymopterus is dependent upon frequent spring rains. Furthermore, this species may remain dormant underground as a taproot and may not emerge when there is insufficient rainfall, so the number of individuals underground could be greater than the number of individuals aboveground. Also, detectability many be low in years when plants only produce leaves and no inflorescences (NatureServe 2010).

The largest and most robust populations of desert cymopterus occur on Edwards Air Force Base. Seventeen population surveys were performed during a study in 1995, a good year for the species, and population sizes at each location ranged from 1 to 1,929 individuals. In total, 14,093 individuals were counted over an area of 1,465 acres (Tetra Tech 1995, cited in NatureServe 2010).

Threats and Environmental Stressors

Desert cymopterus is potentially threatened by habitat alteration and destruction resulting from military activities on Edwards Air Force Base, the expansion of Fort Irwin, oil and gas development, utility construction, renewable energy development, off-road vehicle use, sheep grazing, Land Tenure Adjustment, and urban development (69 FR 64884–64889; CNPS 2011). However, according to the proposed rule (69 FR 64884–64889), the magnitude and relative importance of most of these potential threats were unknown. Grazing by native and non-native herbivores—presumably including mammals, insects, and desert tortoise (*Gopherus agassizii*)—is also a threat to this species. This may contribute to the low-density, dispersed nature of the majority of reported desert cymopterus populations by limiting the plants' reproductive potential and reducing their vigor (Bagley 2006).

Conservation and Management Activities

The vast majority of plants and acreage of habitat for desert cymopterus are currently thought to occur on the Edwards Air Force

Base. Therefore, this species is not covered by the West Mojave Habitat Conservation Plan (Edwards Air Force Base 2002).

Management areas at Haystack Butte and Leuhman Ridge on Edwards Air Force Base support desert cymopterus. Another management area consisting of undeveloped land north of Mercury Boulevard also supports this species (Edwards Air Force Base 2002). The Edwards Air Force Base Integrate Natural Resources Management Plan offers general conservation measures based on an ecosystem approach with a general goal of conserving and improving the habitat that would benefit all native species (Edwards Air Force Base 2002).

Data Characterization

In general, data availability for desert cymopterus is poor except for population data in some years at Edwards Air Force Base. Population trends are difficult to assess due to the fluctuations caused by variation in rainfall year to year. Furthermore, little is known regarding the species' reproduction, seed dispersal, and recruitment, and nothing is known about pollination. No studies have examined seed viability, longevity in the soil, and predation. Nothing is known of the physiology of dormancy in desert cymopterus or how long plants can survive dormancy. In addition, the requirements for seed germination and establishment of new plants in the population are unknown (NatureServe 2010).

Management and Monitoring Considerations

Protection should focus on currently known to occur on Edwards Air Force Base just south of Rogers Lake, and west and south of Leuhman Ridge. The long-term viability of populations may also rely on the protection of habitat corridors between these populations. Little is known of the distribution and abundance of desert cymopterus off Edwards Air Force Base. Focused surveys for this plant should be conducted in suitable habitat off Edwards Air Force base in favorably wet years to determine if high-density sites exist and how any such areas could be protected (Bagley 2006).

Species Modeled Habitat Distribution

This section provides the results of habitat modeling for desert cymopterus, using available spatial information and occurrence information, as appropriate. For this reason, the term "modeled suitable habitat" is used in this section to distinguish modeled habitat from the habitat information provided in Habitat Requirements, which may include additional habitat and/or microhabitat factors that are important for species occupation, but for which information is not available for habitat modeling.

There are 344,996 acres of modeled suitable habitat in the Plan Area. Appendix C includes a figure showing the modeled suitable habitat in the Plan Area.

Literature Cited

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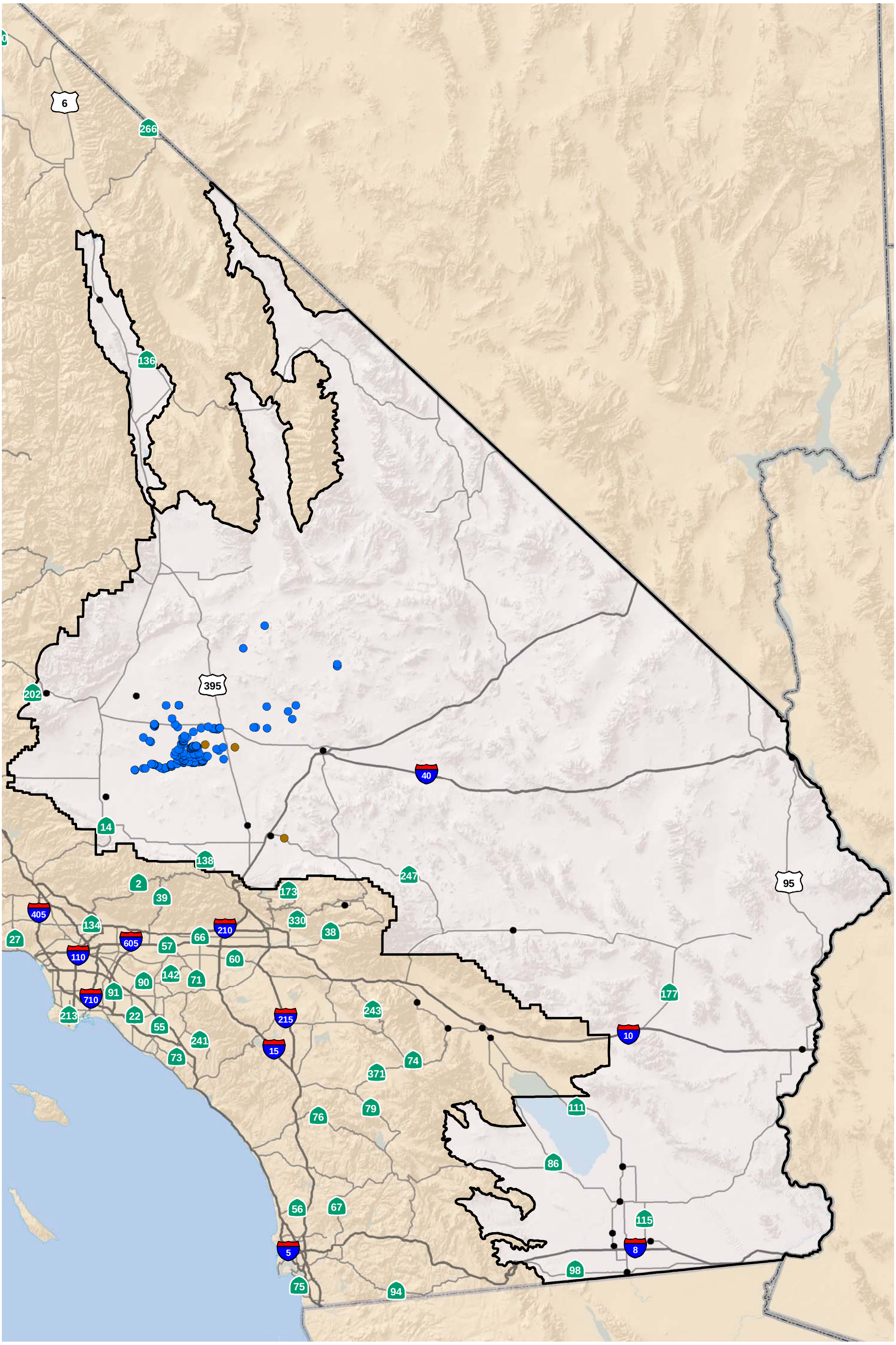
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