

SMALL-FLOWERED ANDROSTEPHIUM

Androstephium breviflorum S. Wats.

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Management Status: Federal: None

California: S1.3 (CDFG, 1998)

CNPS: List 2, R-E-D code 3-1-1 (Skinner and Pavlik, 1994)

General Distribution:

Small-flowered androstephium occurs from the deserts of eastern California (White, et al., 1996) through southern Nevada (Kartesz, 1988) and the southeastern two-thirds of Utah (Albee, et al, 1988) to western Colorado and south to northern Arizona (Cronquist et al, 1977). It is reported to be uncommon in Nevada (Kartesz, 1988), but appears widespread and perhaps fairly common in Utah (Albee, et al., 1988). The distribution of this plant in California is extraordinarily poorly documented. There are a number of reports from scattered areas, but few of these appear to be supported by specimens and only one observer has recorded many. Confirmed California records are discussed below. There is a report of a single individual in Silurian Valley in 1993 (BLM, 1997) and subsequent reports of other individuals in that area (M. Bagley, pers. comm.) but these reports are not supported by specimens and cannot be conclusively confirmed. This species is also reported from an indefinite locality in Inyo County (Skinner and Pavlik, 1994), but this record has been carried in the CNPS Inventory for well over ten years with no definite locality or confirmation ever forthcoming, though the report is supported by generalized reports from Inyo County in the Black Mountains and Greenwater Valley (DeDecker, 1984), but there appear to be no specimens from these localities (unless they're in the private herbarium of M. DeDecker) and confirmation would be very desirable.

Distribution in the West Mojave Planning Area:

In California, this species is known with certainty only from along Interstate 15, from Midway and Dunn (northwest of Afton Canyon toward Alvord Mountain) to Cave Mountain and Cronese Valley, and in Cadiz Valley, east of Twentynine Palms. The Midway/Dunn to Cronese Valley localities are definitely within the WMPA, while the Cadiz Valley location is just outside the southeastern boundary. Except for the Cadiz Valley location, all documented sites are along Interstate 15, the major route of travel across the Mojave Desert. This suggests that the known distribution pattern may largely reflect areas of frequent access by collectors, rather than the actual distribution of the plant. In addition to the areas of known occurrence, there are unconfirmed reports of this species from two other areas in the WMPA. Small-flowered androstephium is reported to occur west of Victorville (Clark et al., 1984), but that location is far from other well documented sites and the documenting specimen cannot now be found (Clark, pers. comm.). It is possible that this record actually applies to crowned muilla (*Muilla coronata*), a somewhat similar plant, which is known from almost exactly the site reported

by Clark. The available published sources describing crowned muilla at the time that Clark et al. wrote (e.g., Munz, 1959; 1974; Abrams, 1923) were inaccurate in a number of respects (Shevock, 1984) and this could have caused a misidentification, though the major key characteristics were described accurately. Vegetative plants thought possibly to be small-flowered androstephium have been found in sandy soil in the southwestern part of the Twentynine Palms Marine Corps Air-Ground Combat Center (UCR, 1993), but these need to be have their identity confirmed when the plants are flowering.

Natural History:

Small-flowered androstephium is a perennial herb growing from a corm with a dense, tawny, fibrous coat. It is early flowering and inconspicuous when in flower, but becomes somewhat more obvious when in fruit due to the greatly enlarged capsules in fruiting material. Flowers are about 0.6-0.9 in. (15-22 mm) long and are dull white to pale violet in color, but the capsule valves are more conspicuous and are ovate to almost round. The color of the flowers fades to brownish in dried material. The capsule valves are 0.44-0.52 in. (11-13 mm) broad and to about 0.8 in. (20 mm) long at maturity. The seeds are black and strongly flattened; about 0.24-0.32 in. (6-8 mm) in diameter, but less than 0.04 in. (1 mm) thick. Each plant has 2-3 slender leaves from the base and sends up a single stiff peduncle supporting an umbel of flowers in the spring (about March in California, but as late as May at higher elevations farther east). The pedicels of the individual flowers are relatively short at flowering but elongate greatly in fruit and become up to 2.4 in. (60 mm) long, though some individuals can have fruiting pedicels as short as 0.32 in. (8 mm). The branches of the umbel are subtended by conspicuous bracts, which persist and become papery in fruit.

Nothing appears to be known about reproduction, germination requirements, seed dispersal or pollination in this species. It can be inferred that, like many similar monocotyledons, small-flowered androstephium reproduces regularly by the production of vegetative offsets from mature corms. Other species of similar habit (e.g., *Dichelostemma capitata*, wild hyacinth) multiply rapidly by this means during favorable periods (pers. obs.), though such reproduction is not detectable on the 16 flowering specimens with intact corms examined during preparation of this note. The corms are apparently normally located quite close to the soil surface, with all those examined having been buried less than two inches, most only one inch, below the surface. Many specimens, however, are collected without corms (10 such specimens examined) and it is possible that these include many with more deeply buried corms. Few of the 26 specimens examined, from throughout the range of the species, showed any evidence of herbivore attack, either by insects or vertebrates. A single specimen showed damage from, and the dried body of, a lepidopteran (moth) larva. There was a hole in an unopened bud and the dried body of the herbivore was present in this. Aside from this one insect, there were no dried aphids, scales or other insect predators present on any of the specimens, though such plant feeding insects are commonly inadvertently preserved on herbarium specimens.

Habitat Requirements:

In California this appears to be primarily a species of open sandy flats and bajadas at low to moderate elevations. All specimens taken in California are from elevations

between 890 and 2100 ft. (270-640 m), though Keator (1993) reports the species occurs from “700-1600 m”. Keator had seen no specimens from California and probably based his elevation range on specimens from outside the state, where it has been collected at elevations up to 7550 ft. (2300 m). Its apparent restriction in California to sites with relatively sandy soils, often stabilized blowsand, needs to be emphasized. This species’ recorded scarcity in California is difficult to understand since its preferred habitat is not particularly restricted or small in amount. There may be ecological details about the sites occupied that are not obvious, or it may be that many suitable sites have not been searched at appropriate seasons. The scattered unconfirmed reports of the species certainly suggest the possibility of additional occupied habitat. In adjacent states, this species is reported from a greater range of habitat types than it is known from in California, where it is at the edge of its range. However, in northern Arizona it is reported “mostly in sandy soil” (McDougall, 1973), which is consistent with its ecological preferences in California.

The species, considering its range as a whole, occurs primarily in locations that are cold in the winter, which suggests that it may have a vernalization requirement for flowering. Consistent with this is the fact that the only other species in the genus, the blue funnel lily [*A. caeruleum* (Scheele) Torr.], is endemic to the south-central U.S. (Kansas to Texas) which is also an area with cold winters. However, the closest genus to *Androstephium* may be *Bessera* (Mabberley, 1997), a Mexican genus of distinctly tropical affinities with which *Androstephium* has frequently been united, but this relationship is doubtful (J.C. Pires, pers. com.). Such a hypothetical requirement for winter chilling may not be met by the conditions on the low desert of California, and this environmental condition may cause the southern limit of its distribution. This plant was, until recently, not reported at all from the Sonoran Desert (Shreve and Wiggins, 1964), though the Cadiz Valley location (White, et al., 1996) is at the northern edge of that desert.

It may be noteworthy that this species occurs primarily east of California in areas with relatively high amounts of summer rainfall and that all the well documented sites in California are toward the eastern side of the Mojave desert in areas where summer rainfall is relatively frequent (Rowlands, 1995). Except for the Clark collection, this species is not reported from the western Mojave Desert in the areas strongly influenced by the Californian summer dry weather regime.

Population Status:

This appears to be a species that has just never been very common in California. It was unreported for California in most floras written prior to *A California Flora* (Munz, 1959) and was probably just overlooked by the early collectors (Jepson, 1925; Munz, 1935; Jaeger, 1941), though it was reported rather indefinitely from “vicinity of Needles” by Abrams (1923). The identity or origin of any specimen that motivated that report may be in question, since there appear to be no reports by more recent authors of this species from the vicinity of Needles. In fact, Munz (1959; 1974) and Keator (1993) even indicate that this species needs clear documentation as occurring in California at all. Though, there were a few specimens available in California herbaria prior to 1993 (White, et al., 1996), but these were not well known. Reported populations are widely scattered and additional populations could probably be found by diligent searching of appropriate habitat zones. It may be that the species genuinely is scarce because it’s at the edge of its range and habitat

conditions are marginal for the species. The restriction to sandy soils suggests that lack of moisture may be a major factor controlling this species: farther east in its range it is reported from clay soils (Weber, 1987). In arid areas, sandy soils are effectively wetter than clay soils because water can more readily penetrate to sufficient depth to avoid being removed by the atmosphere. In clay soils the greater surface area of the soil particles holds the water from the scarce rains in the top few inches of soil where it can readily be removed by the dry atmosphere (Walter, 1973).

The known populations of this species are apparently all very small, but there appear to have been no attempts to systematically count any of the populations. In the late 1970s, the populations in the Cronese Valley and at Midway were very small and the plants widely scattered (pers. obs.). Observations in March 1998 revealed that the Cronese Valley site still held a very small population (<20 plants) but that the Midway population could not be rediscovered at all (pers. obs.). Recent reports in the Dunn and Cave Mountain areas are all of very small populations, almost all less than 10 individuals. The largest reported population is of 20 flowering plants, plus some sterile ones, south of East Cronese Lake in 1993. The recent collection from Cadiz Valley was from a population of "12 plants in scattered patches" according to the specimen label (and see, White, et al., 1996).

It is entirely possible that this species is more common in California than is currently known. There have not been many searches for the plant and probably none that covered extensive areas of approximately suitable habitat. This species is one that cannot be found much of the year due to its geophytic habit and relatively short period of active growth, thus making it easy to miss.

Threats Analysis:

Significant current threats to this species are not obvious. The areas occupied are largely remote from large scale economic activity and the specific sites occupied are generally so arid that little forage is produced and so grazing is generally not conducted on a significant scale. There is off-road vehicle activity in the areas occupied, but the extent of any damage being done by such vehicles has not been quantified. Some individuals have been lost to highway construction and other acts of land conversion, but it is difficult to see that the populations in California are significantly different than they ever were in historic times. Some plants were doubtless destroyed in the construction of Interstate 15, but the number is unknown. At Midway, the species occurred on the sides of the freeway, as well and in the median strip between the east and west bound lanes in the 1970s. It could not be found in that area in 1998 and may have been destroyed by the expansion of roadside rest areas (pers. obs.). In any event, it is virtually certain that it formerly occurred in the area now covered by the asphalt of the freeway. Other construction activities in the areas where it occurs may occasionally result in the destruction of a few individuals, but this has not been documented. There are several reports based on surveys along proposed utility corridors, so there may be some threat from construction of powerline towers or pipelines. There is no known threat to the species by urban or residential development since all three populations occur on remote federal lands.

There are no existing mechanisms for the protection of this species. While it may be very rare in California, it has been reported at such scattered locations at such a

distance from human activity that it has never been seriously considered for protection. It appears not to be threatened and may be more common than is currently known.

Biological Standards:

At the present time the natural distribution of this species is so poorly documented in California that it is impossible to outline areas critical for its survival or the areas where populations are densest. As things stand, all we have are a few scattered sites from which the species is known, but there have been no systematic surveys for the species and as a result it is very poorly known. It is not known how extensive the existing populations are or whether other larger populations may exist elsewhere. The Clark specimen needs to be found and checked to determine whether this species does in fact occur in the Victorville area.

Several recent reports of this species (BLM, 1997) are unsupported by specimen records from the area where the species is reported and hence are of marginal value. Future surveys must document any populations found with specimens deposited in recognized herbaria.

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