Changed name to *Cylindropuntia fosbergii* and rank to California Rare Plant Rank 1B.3 in the CNPS Inventory on May 7, 2012

Rare Plant Status Review: *Cylindropuntia xfosbergii*
Rank change from Rank 3, G1G3 / S2 to 1B.3, G2 / S2;
Name change to *Cylindropuntia fosbergii*

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Changes made to the original document appear in blue text.

Background

Cylindropuntia x*fosbergii* is a California endemic, perennial stem succulent in the Cactaceae family. It is included in *The Jepson Manual, Second Edition* (*TJM 2*; available online at http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=93860), and included as *Opuntia* x*fosbergii* in *The Jepson Manual* (1993), but is not included in *Flora of North America* (*FNA*, Vol. 4). It has been included as a Rank 3 species in the CNPS Inventory since 2009. This taxon has undergone several taxonomic revisions, being formerly known as *Opuntia fosbergii*, *O.* x*fosbergii*, and *O. bigelovii* var. *hoffmannii*. *Opuntia bigelovii* var. *hoffmanii* was included in the 2nd Edition of the CNPS Inventory (1980), but was rejected from the 3rd Edition (1984) due to its uncertain taxonomic status. *Cylindropuntia* x*fosbergii* is thought to be a hybrid taxon due to its sterility (it only reproduces vegetatively; no seeds are produced). If in fact it is a hybrid, one of its parents is likely *C. bigelovii*; the two taxa share morphological features, including an erect habit, a single trunk with few main branches, and terminal segments that are easily detached and <10cm long. Also, they have an overlapping distribution, and are closely related genetically. Both taxa are triploid, although some diploid populations of *C. bigelovii* also exist. The hypothesis of a hybrid origin of *C.* x*fosbergii* is complicated because another parent species has not been identified; it was long assumed that the other parent was either an extinct taxon or another close relative that occurs nearby in the Anza-Borrego Desert (Mayer et al. 2011).

Mayer et al. (2011) further investigated the origin of *C.* x*fosbergii* by performing genetic analyses of *Cylindropuntia* spp. that occur in the Anza-Borrego Desert, which included *C. echinocarpa, C. ganderi, C. californica* var. *parkeri,* and *C. wolfii*, in addition to *C.* x*fosbergii* and *C. bigelovii*. No other taxon stood out as a possible parent of *C.* x*fosbergii*, as the number of shared loci between *C.* x*fosbergii* and *C. bigelovii* was at least 10-fold greater than the number of loci shared between *C.* x*fosbergii* and any other taxon. Moreover, the data gathered by Mayer et al. (2011) do not support the hypothesis that *C.* x*fosbergii* resulted from recent hybridization. If the hybridization events were recent and recurrent, a significant amount of genetic variation would be expected within *C.* x*fosbergii*; its lack of genetic variation and high number of unique loci suggest that, if it is of hybrid origin, the hybridization event was ancient. Also, the populations of *C. bigelovii* from the Anza-Borrego Desert are sterile, making recent hybridization an unlikely scenario. If of hybrid origin, *C.* x*fosbergii* is stabilized, and a similar hybrid is unlikely to form (Mayer et al. 2011).

Mayer et al. (2011) also proposed the hypothesis that *C.* x*fosbergii* is a sister species to *C. bigelovii*, and not its hybrid offspring. *Cylindropuntia* x*fosbergii* may have evolved from isolated populations of *C. bigelovii* and suffered a genetic bottleneck, resulting in its current low genetic diversity. Since the evidence clearly shows that *C.* x*fosbergii* has a close relationship to *C. bigelovii*, and does not strongly support the hypothesis of a hybrid origin, this possibility should also be considered (although the evidence does not refute the possibility of an ancient hybridization event). Mayer et al. (2011) make the recommendation that *C.* x*fosbergii* be treated as a species rather than a hybrid, as it is clearly a stabilized taxon that has existed for a long time, and could not be produced again through a modern hybridization event.

Based on the information published by Mayer et al. (2011), CNPS and CNDDB recommend that *C.* x*fosbergii* be moved from Rank 3 to Rank 1B.3, and change to *Cylindropuntia fosbergii*. ~~Mayer et al. (2011) does not provide a non-hybrid name for the species, so CNPS and CNDDB will continue to recognize it as *C.* x*fosbergii*.~~

Recommended Actions
CNPS: Re-rank from CNPS 3 to CNPS 1B.3, change name to *Cylindropuntia fosbergii*
CNDDB: Re-rank from G1G3 / S2 to G2 / S2, change name to *Cylindropuntia fosbergii*

Revised CNPS Inventory Record
Cylindropuntia ~~x~~*fosbergii*
Mason Valley cholla
Cactaceae
Rank 1B.3
San Diego
Arroyo Tapiado (018B) 32116H2, Sweeney Pass (018C) 32116G2, Agua Caliente Springs (019A) 32116H3, Monument Peak (019B) 32116H4, Earthquake Valley (032C) 33116A4
Sonoran desert scrub; elevation 85-850 meters.
Perennial stem succulent; blooms March – May.
Potentially threatened by development. ~~A stabilized, self-sustaining taxon that should be recognized as a species.~~ Possibly an ancient hybrid with *C. bigelovii* and another, possibly extinct, taxon; but more likely a sister-species of *C. bigelovii*. See *C.* x*fosbergii* in *TJM 2*. See *Occasional Papers of the Rancho Santa Ana Botanic Garden* 1:79 (1938) for original description, and *Madroño* 58(2):106-112 (2011) for information on possible hybrid origin.

Literature Cited

Mayer, M.S., A. Gromova, K. Hasenstab-Lehman, M. Lippitt, and M. Barnett. 2011. Is *Cylindropuntia* x*fosbergii* (Cactaceae) a hybrid? *Madro*ño 58(2): 106-112.