ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Plant Abstract **Element Code:** PDCAC0E060
Data Sensitivity: YES

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Pediocactus sileri* (Engelm. Ex J.M. Coult.) L.D. Benson
COMMON NAME: Siler pincushion cactus, Siler's pincushion cactus, Siler pediocactus, Gypsum cactus
SYNONYMS: *Echinocactus sileri* Engelman, *Utahia sileri* Britton and Rose.
FAMILY: Cactaceae

AUTHOR, PLACE OF PUBLICATION: *Pediocactus sileri* L.D. Benson, Cactus and Succulent Journal [U.S.] 33(2): 53. 1961. *Echinocactus sileri* Engelm. Ex J.M. Coult., Contributions from the United States National Herbarium 3(7): 376. 1896.

TYPE LOCALITY: Pipe Springs, Coconino County, Arizona, but those springs were thought by early collectors to be in Utah, hence the *Utahia*, which commemorates an Arizona type. (Welch et al., 1993).

TYPE SPECIMEN: HT: MO. A.L. Siler s.n. May 1883.

TAXONOMIC UNIQUENESS: Genus is comprised of between 6 and 11 species depending on the authority, FNA recognizes 9. All species in the genus occur north of Mexico, within the Columbia River Basin, Great Basin, Rocky Mountains and Colorado Plateau. Many of these species, including *P. sileri*, are restricted endemics. There are no recognized varieties of *P. sileri. Pediocactus sileri* does not resemble typical *Pediocactus*, being larger with robust spines. *P. sileri* is included in the genus based on similarities in fruit characteristics with the other *Pediocactus*.

DESCRIPTION: Small, solitary, occasionally clustered, globose, usually single stemmed cactus typically 10.0 cm (4.0 tall) (as great as 45.0 cm [18.0 in.]) tall and 7.6-10.0 cm (3.0-4.0 in.) in diameter, occasionally larger. According to Utah Rare Plant Book, cacti are 5.0-25.0 cm (2.0-10.0 in.) tall. This species is depressed-hemispheric to cylindroid and tends to elongate as it ages. Each circular areole contains 3-7 **brownish-black central spines**, these are straight or slightly curved (not hooked), becoming pale gray or nearly white with age. There are 11-16 **whitish radial spines** per areole. The central spines are about 2.5 cm (1.0 in.) long, the radials slightly less. Flowers are about 2.5 cm in diameter, yellowing marginally scarious petals with maroon veins. Fruits are greenish-yellow, somewhat enlarged upwards, with scales toward the top; they dry at maturity. Seeds are gray, 4.5 mm broad.

AIDS TO IDENTIFICATION: Distinctive in its near globose form (except older plants which are more elongate), stout blackish-tipped central spines contrasting with the slender, whitish radials. Easy to distinguish from other cacti; the hedgehog cactus (*Echinocereus*) is thinner stemmed with larger spines. *Coryphantha vivipara* var. *rosea* in the adult stage looks similar; however it has pink flowers and *P. sileri* has thicker radials and fewer central spines (Falk, Jenkins et al. 2001).

ILLUSTRATIONS:
Black and white photo (Benson 1969: Fig.8.2, p.183).
Black and white photo (Benson 1982: Figs.798-800, pp.762-763).
Black and white photo (Earle 1963: p.75).
Black and white photo (Gierisch 1981: Fig.801, p.10).
Black and white photo (Heil 1981: Fig.18, p.28).
Line drawing (Welsh 1979: p.104).
Line drawing (USFWS).
Color photos (USDA, NRCS PLANTS Database)
Line drawing (*In* Falk, Jenkins et al. 2001)
Color photos (Lee Hughes/BLM, *in* Falk, Jenkins et al. 2001)
Color photo (Art Phillips, *in* Falk, Jenkins et al. 2001)
Color photos of plant and habitat (C. Delmatier, *in* Utah Rare Plant Book).
Color photo (USFWS 2018)

TOTAL RANGE: Limited to southwestern Utah (vicinity of St. George) and northwestern Arizona, where it is ecologically restricted to a specific gypsum and salt-rich soil.

RANGE WITHIN ARIZONA: Northern Arizona in Mohave County from Hurricane Cliffs to vicinity of Pipe Springs and Fredonia, Coconino County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Succulent perennial.

PHENOLOGY: Flowers from April to mid-May, with fruits maturing May through June; March – April (June – August) in Utah. Above average precipitation is correlated with high recruitment, while below-average precipitation is correlated with low to nonexistent recruitment, higher levels of herbivory, and increased mortality.

BIOLOGY: Though flowers may remain open for more than three days, only one day is needed for pollination to occur. In Arizona, bees which pollinated *P. sileri* were six species of *Ashmeadellia* and one of *Anthophora* (from Tepedino). Mortality in *P. sileri*, has been caused by unidentified insect larvae, which eat the cactus leaving a shell of thorns behind. Rabbits and rodents also use *P. sileri* as a food source.

Limiting factors for *Pediocactus sileri* include: specialized soil type, cold winters, summer dormant period, and drying out periods. Frequent causes of mortality include rabbit and rodent predation, drought, or age-related mortality.

HABITAT: Low red or gray gypsiferous badlands derived from the Moenkopi Formation, 2,800-5,400 ft (850-1650 m) elevation. In Utah, also found in seleniferous and calciferous shale, besides gypsiferous shale of the Moenkopi Formation (Utah Native Plant Society, 2003).

ELEVATION: 2,800 - 5,800 ft. (854 - 1,769 m)

EXPOSURE: All aspects and on slopes varying from 0-80 degrees.

SUBSTRATE: Gypsum, selenium, calcareous clay and sandy soils high in soluble salts, from the Moenkopi Formation. Most known plants are associated with the Shnabkaib Member of the Moenkopi Formation, but are also found on the Middle Red Member of the formation.

PLANT COMMUNITY: "*P. sileri* occurs within three broad vegetation communities. The largest distribution is in the Great Basin Desert Shrub Biotic Community; a few of the higher elevation cacti sites are located in the Great Basin Conifer Woodland and Plains and Great Basin Grassland; one low elevation cacti site is located in the Mohave Desert Scrub" (Hughes, 1990).

P. sileri occurs in the sagebrush, desert shrub and pinyon-juniper forest/rangeland associations. The vegetation is of low stature and very sparse. Dominant associated species include: *Atriplex confertifolia* (Shadscale), *A. canescens* (four-wing saltbush), *Artemisia tridentata* (big sagebrush), *A. bigelovii* (flat sagebrush), *Gutierrezia sarothrae* (broom snakeweed), *Eriogonum corymbosum* (crispleaf wild-buckwheat), *E. microthecum* (slender buckwheat), *Chrysothamnus nauseosus* (rabbit-bush), *C. viscidiflorus* (stocky-leaf rabbit-bush), *Ephedra* spp. (Mormon tea), *Hilaria jamesii* (James galleta), and *Oryzopsis hymenoides* (Indian Mountain-ricegrass). At higher elevation sites, associated species include: *Pinus edulis* (two-needle pinyon pine), *Juniperus osteosperma* (Utah juniper), *Cowania mexicana* (cliffrose), and *Yucca baccata* (Banana yucca). At some low elevation sites, associated species include: *Larrea tridentata* (creosotebush), *Ambrosia dumosa* (white bursage), and other species of low elevation desert. (ESIS, FWIE 1998).

POPULATION TRENDS: Population trends differ between populations, but numbers of individual plants have shown a decreasing trend (USFWS 2018). Mortality is exceeding recruitment in most monitored populations, and representation across age classes is uneven. USFWS 2008. Because monitoring plots are non-random, overall population status in unable to be determined.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LT (USDI, FWS 1993)
[PT USDI, FWS 1993]
[LE USDI, FWS 1985]
[PE USDI, FWS 1980]
[PE USDI, FWS 1976]
[PE USDI, FWS 1975]

STATE STATUS: Highly Safeguarded (ARS, ANPL 1999)
[Highly Safeguarded (ARS, ANPL 1993)]

OTHER STATUS: Not Sensitive (USDA, FS Region 3 2013, 1999)
[Forest Service Sensitive (USDA, FS Region 3 1990)]
Bureau of Land Management Sensitive (USDI, BLM AZ 2017, 2005)
Appendix I (CITES 1983)
Rare in AZ and Endangered in UT (IUCN 1998)

MANAGEMENT FACTORS: This species is vulnerable to threats because of its specific habitat requirements. Threats include mining of uranium and gypsum, oil and gas leases, off-highway vehicle activity, commercial and residential development, livestock trampling, construction of the Lake Powell Water Pipeline, climate change and long-term drought. Uranium mining is now considered a minor threat, due to withdrawal of more than one million acres of land from mining for locatable minerals by the Secretary of the Interior in 2012. This withdrawal is valid until 2032 (USFWS 2018). BLM monitoring plots have shown that the greatest mortality of plants is due to predation by rodents, lagomorphs and insects.

CONSERVATION MEASURES TAKEN: Several Areas of Critical Environmental Concern have been established by BLM. The Fort Pierce and Warner Ridge areas were established as Areas of Critical Environmental Concern and are closed to OHV use and patrolled (USFWS 2008). Additional lands are proposed, and would increase protection of Siler pincushion cactus to 41,345 acres on BLM land (USFWS 2008). In Utah the White Dome Nature Preserve was established to protect 800 acres of habitat for several rare species, including the Siler pincushion cactus (York 2007).

In addition, the BLM has surveyed habitat and document locations throughout the range of the species, established annual monitoring plots, used authority within the section 7 process of the Endangered Species Act and the 1872 Mining Law to conserve cactus habitat, and closed routes through cactus habitat to vehicle travel (USFWS 2018).

Researchers at Utah State University conducted population demographic studies of Warner Ridge, Muggin's Flat, and Atkins Well. The obtained data will be used to develop recovery

criteria which are measurable and objective, associated with general ecology and reduction of threats (Sodja and Schupp 2016).

SUGGESTED PROJECTS: Recommended actions outlined in the 2018 5-year review of the species include updating the Recovery Plan; assisting the Kaibab-Pauite Indian Tribe in conducting surveys and conserving cactus on their lands; quantifying seedling survivorship; establishing monitoring plots throughout the range; closing areas of dense concentrations of cactus to OHV use; and researching predation and drought impact on populations (USFWS 2018). Propagation techniques are needed to provide nursery stocks both to reduce collecting and for possible reintroduction.

LAND MANAGEMENT/OWNERSHIP: BIA – Kaibab Paiute Reservation; BLM – Arizona Strip Field Office; State Land Department; Private. This species is not expected to occur on National Forest land.

SOURCES OF FURTHER INFORMATION

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ADDITIONAL INFORMATION: *P. sileri* is not known to occur on Forest Service lands. There is probably little potential habitat on the Kaibab NF, the only possibility being north of Highway US 89A as the road drops off of the plateau (including portions of section 34).

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1991-12-06 (DBI)
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