

**ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM**

Plant Abstract

Element Code: PDCAC0E053

Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Pediocactus peeblesianus* ssp. *peeblesianus*

COMMON NAME: Peebles Navajo Cactus, Navajo pincushion cactus, Navajo Cactus, Navajo Plains Cactus

SYNONYMS: *Pediocactus peeblesianus* (Croizat) L. Benson var. *peeblesianus*, *Navajoa peeblesiana* Croizat *Echinocactus peeblesianus* (Croizat) L.D. Benson, *Toumeyia peeblesiana* Marshal, *Utahia peeblesiana* (Croizat) Kladiwa

FAMILY: Cactaceae

AUTHOR, PLACE OF PUBLICATION: *Pediocactus peeblesianus* L.D. Benson, Cactus and Succulent Journal [U.S.] 34(2): 58. 1962. *Navajoa peeblesiana* Croizat, Cactus and Succulent Journal [U.S.] 15(6): 89, f. 42. 1943.

TYPE LOCALITY: USA: Arizona: Navajo County: Holbrook, hill behind the plant quarantine inspection station (The statement on the label of the type sheet in the Herbarium of the U.S. Field Station, Sacaton, AZ [now housed at the University of Arizona Herbarium] attributes the finding of the taxon to Mr. Whittaker of the Arizona Highway Department).

TYPE SPECIMEN: HT: ARIZ 137135. J. Whitman Evans at Holbrook, AZ, 1939. IT: DES.

TAXONOMIC UNIQUENESS: Eight species of *Pediocactus*, occurring from the Columbia River Basin, Great Basin, Rocky Mountains, and Colorado Plateau. Six of these species, including *P. peeblesianus*, are restricted endemics. There are two recognized subspecies of *P. peeblesianus* including ssp. *peeblesianus* and ssp. *fickeiseniae*; both occur in Arizona.

DESCRIPTION: Non-technical: A small, solitary or rarely clustered, globose cactus to 2.5 cm (1.0 in.) in height and 1.5 to 2.5 cm (0.6-1.0 in.) in diameter. The four (3-5) spongy-fibrous radial spines form a twisted cross and there are no central spines. Yellow to yellow-green flowers are up to 2.5 cm in diameter, often larger than and hiding the smaller plant below. The small fruits dry and turn tan at maturity. During dry weather, the plants retract into the soil.

Technical: Stem(s) obscure, solitary or rarely clustered somewhat glaucous, obovoid, globose, ovoid-cylindroid, or depressed-globose, often with only the summit protruding above ground largely retracted into the soil during dry weather. Up to 2.5 cm long, 1.5 to 2.5 cm in diameter; areoles circular; spines nearly covering the surface of the stem but not obscuring it;

central spine none. The upper radial spine often longer than the others and up to 7.5 mm long; surface of the spine and the tissues beneath remarkably spongy-fibrous; radial spines usually 4 but in some areoles sometimes 3 or 5, recurring with the appearance of a cross. The flower is about 1.5 to 2.5 cm in diameter; petaloid perianth parts yellow to yellow-green, usually with a median band of green or pale pink, filament whitish or pale green, anthers yellow; style cream color, stigmas 6-8. Fruit greenish, changing to tan and drying at maturity, without surface appendages or with 1 or a few scales on the upper portion, subcylindroidal but broader above, 6-9 cm long, 4.5-7.5 mm in diameter, both circumscissile and opening along a full-length dorsal slit. Seeds are black to dark gray, obliquely obovoid 2.5 mm long, 1.5-2.0 mm broad, 1 mm thick; hilum slightly curved (Benson 1962, 1969, in A. Phillips et al. 1979).

AIDS TO IDENTIFICATION: *Pediocactus peeblesianus* ssp. *peeblesianus* has no central spines and four (3-5) spines arranged in a twisted cross while *Pediocactus peeblesianus* ssp. *fickeiseniae* has a prominent central spine and six (to 7) spreading radial spines.

ILLUSTRATIONS:

Black and white photos, color photo, line drawing (Benson 1982: Figs. 805-807, pp. 767-768).

Black and white photo (K. Heil et. al. 1981).

Black and white photo (Benson 1969[1981]: Fig. 8.5, p. 186).

Line drawing (USFWS 1984).

Line drawing (USFWS in Falk, Jenkins et al., 2001)

Color photos of plant and habitat (Falk, Jenkins et al., 2001)

Color photo (USFWS, Arizona E.S. accessed 2003, <http://arizonaes.fws.gov/>).

Color photo (Peter Warren, in Kelly and McGinnis 1994)

TOTAL RANGE: Arizona endemic. Little Colorado River watershed approximately 1,700 to 1,750 m elevation, from near Joseph City to the Marcou Mesa region northwest of Holbrook, Navajo County, Arizona.

RANGE WITHIN ARIZONA: See "Total Range."

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Globose succulent perennial.

PHENOLOGY: Flowers in April and early May; fruits immediately thereafter from May to June.

BIOLOGY: *Pediocactus p.* ssp. *peeblesianus* grows in a harsh, is sparsely vegetated environment, retracting into the soil during dry weather when water is unavailable. According to Falk, Jenkins et al. (2001), "monitoring has revealed fluctuations in flowering and fruiting success, and plant numbers. Seedling germination and establishment occur at

intervals correlated with favorable amounts of precipitation. Growth rates are slow and reproduction does not occur until the plants are > 8 years old.”

HABITAT: Exposed sunny situations in weakly alkaline, gravelly soils of the Little Colorado paleochannels (Taylor 2008). Stewart et al. (1972) narrowly described their habitat as gravelly alluvium derived from the Shinarump Member of the Chinle formation, occurring on gently sloping hills to flat hilltops, in desertscrub and grassland. However, 2002 surveys by Al Burch (BLM Geologist and Minerals & Renewable Resources Group Manager) and John Anderson (BLM State Botanist) found, “although some plants were loosely consolidated pebble to cobble gravels that occur unconformably on top of the indurated Shinarump, many occurrences were stratigraphically above the Shinarump in weakly alkaline, very coarse sand to cobble gravel deposits that unconformably overlie the finer grained facies of the Chinle Formation. The gravels can occur in swales, on ridges, or, at some localities, as gravel caps on buttes.”

ELEVATION: 5,100 - 5,650 feet (1556-1723 m).

EXPOSURE: All aspects; slopes from 0 to 30 degrees.

SUBSTRATE: Gravelly soils with an alkaline pH of around 8.15 (Stewart et al. 1972). Previously described as occurring only in the Shinarump conglomerate of the Chinle formation by Stewart et al. (1972), Burch (*in* Taylor 2008) believes most of the gravels that host *Pediocactus p. ssp. peeblesianus* are remnants of bars and terraces of Little Colorado paleochannels.

PLANT COMMUNITY: Plains and Great Basin Grassland biotic community, near the ecotone and transition of the Great Basin Desertscrub community (Brown and Lowe 1980). Associated plants include: *Amsonia peeblesii* (Peebles’ blue-star), *Artemisia bigelovii* (flat sagebrush), *Artemisia tridentata* (big sagebrush), *Atriplex canescens* (four-wing saltbush), *Atriplex confertifolia* (shadscale), *Chrysothamnus nauseosus* (rabbit-bush), *Coryphantha (Escobaria) vivipara* (common pincushion cactus), *Ephedra cutleri* (Cutler’s jointfir), *Ephedra torreyana* (Torrey’s Mormon tea), *Eriogonum corymbosum* (crispleaf wild-buckwheat), *Gutierrezia sarothrae* (broom snakeweed), *Hilaria jamesii* (James galleta), *Juniperus sp.*, *Opuntia spp.*, *Rhus trilobata* (Skunkbush sumac), *Sclerocactus whipplei* var. *whipplei* (Whipple’s fishhook cactus), and *Zinnia grandiflora* (Rocky Mountain zinnia).

POPULATION TRENDS: The historic and present range of this plant, are assumed to be similar. Known from 5 small populations in a tiny area of northern Arizona, where it is restricted to a specific, gravelly soil type (NatureServe 2003). Approximately 1,000 plants are known to exist and although plots have been established and monitored, no definite conclusions have been made concerning trends on the population dynamics of the taxon. The population that is left in the wild is sought by collectors and threatened by off-road vehicles, urban development, and continued gravel pit operations. Gravel quarrying has destroyed as much as one-fourth of the potential habitat in the area. (NatureServe 2003).

“The extremely limited geographic distribution, restricted gene pool, and low number of individuals make *P. peeblesianus* ssp. *peeblesianus* vulnerable to extinction. Reproduction may be insufficient to maintain long-term populations” (Arizona Game and Fish Department 1998, in U.S. Fish and Wildlife Service, International Affairs 2003).

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE (USDI, FWS 1979, without Critical Habitat)
[PE USDI, FWS 1976]

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

OTHER STATUS: Most Critically Endangered (USDI, CITES Appendix I 1996)
[Most Critically Endangered (CITES, Appendix I 1983)]
[CITES 1975]
Endangered (IUCN, 1998)

MANAGEMENT FACTORS: Extremely limited geographic distribution, restricted gene pool, and low number of individuals make this taxon vulnerable to extinction. Reproduction may be insufficient to maintain long-term populations. Threats include gravel mining, urban development, off-road vehicle traffic, road construction, and “cactus collecting.” In addition, trampling of plants and habitat disturbance caused by livestock grazing and rock/petrified wood collectors also poses a possible threat.

PROTECTIVE MEASURES TAKEN: Protected from illegal international trade by the Convention on International Trade of Endangered Species of Fauna and Flora (CITES). Protected by the Arizona Native Plant Law. Also protected by the Endangered Species Act of 1973, as amended in 1982, and by the Lacey Act, as amended in 1981.

SUGGESTED PROJECTS: Continue to monitor populations and habitat; protect populations on private and federal lands; withdraw habitat from mineral entry; prohibit ORV use in existing habitat; prevent livestock grazing in existing and potential habitat in spring and completely in known areas of high density cactus populations; study the ecological requirements of this cactus; develop public education program to enhance awareness and support for the preservation of this cactus; develop successful methods of propagation to provide nursery stocks to reduce collection pressures; consider introducing/reintroducing nursery grown stock to natural habitat; enforce existing laws and regulations.

LAND MANAGEMENT/OWNERSHIP: BLM - Safford Field Office; Private.

SOURCES OF FURTHER INFORMATION

REFERENCES:

- Benson, L. 1962. A revision and amplification of *Pediocactus* IV. *Cactus and Succulent Journal* (US) 34(6): 163-168.
- Benson, L. 1969. *The cacti of Arizona*. Third edition. The University of Arizona Press. Tucson, Arizona. Pp.184-186.
- Benson, L. 1982. *The cacti of the United States and Canada*. Stanford University Press. Stanford, California. Pp. 764-768.
- Falk, M., P. Jenkins, et al; Arizona Rare Plant Committee. 2001 *Arizona Rare Plant Guide*. Published by a collaboration of agencies and organizations. Pages unnumbered.
- Fletcher, R.A. 1979. *Pediocactus peeblesianus* var. *peeblesianus* Abstract. USDA, Forest Service, Region 3. Albuquerque, New Mexico. 5pp.
- Heil, K., B. Armstrong, and D. Schleser. 1981. A review of the genus *Pediocactus*. *Cactus and Succulent Journal* (US) 53: 17-39.
- Integrated Taxonomic Information System (ITIS). Retrieved 12/10/2003 from ITIS, <http://www.itis.usda.gov>.
- Kearney, T.H., R.H. Peebles with collaborators. 1951. *Arizona flora*. Second edition with supplement by J.T. Howell, E. McClintock and collaborators. 1960. University of California Press. Berkeley. Pp. 575-576.
- Kelly, K. and J. McGinnis. 1994. Highly safeguarded protected native plants of Arizona. Arizona Department of Agriculture, Native Plant Protection Program. Phoenix, Arizona.
- McDougall, W.B. 1973. Seed plants of northern Arizona. The Museum of Northern Arizona. Flagstaff, Arizona. Pp. 325-326.
- Missouri Botanical Garden – TROPICOS, Nomenclatural Data Base. *Pediocactus peeblesianus* (Croizat) L.D. Benson. http://mobot.mobot.org/cgi-bin/search_vast. Accessed: 10 Dec 2003.
- NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. Arlington, Virginia. Available: <http://www.natureserve.org/explorer>. (Accessed: December 10, 2003).
- Phillips, A.M., III, B.G. Phillips, and E.M. Peterson. 1979. Status Report: *Pediocactus peeblesianus* (Croiz.) L. Benson var. *peeblesianus*. U.S. Fish and Wild Service, Albuquerque, New Mexico. 11pp.
- Phillips, B.G., A.M. Phillips III, and C.C. Avery. 1988. Population biology and monitoring studies of Peebles Navajo Cactus (*Pediocactus peeblesianus* var. *peeblesianus*). U.S. Fish and Wild Service, Albuquerque, NM.
- Rutman, S. 1992. Handbook of Arizona's endangered, threatened, and candidate plants. U.S. Fish and Wild Service, Phoenix, AZ.
- Taylor, M.A. 2008. Habitat used by Peebles Navajo Cactus, *Pediocactus peeblesianus* var. *peeblesianus*. Memorandum to Field Supervisor, U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office. 25 Nov 2008; In Reply Refer to: 6840 (AZ-932).
- USDA, NRCS. 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

- USDI, Fish and Wildlife Service. 1976. Proposal to determine *Pediocactus peeblesianus* var. *peeblesianus* to be an endangered species. Federal Register 41: 24523-24572.
- USDI, Fish and Wildlife Service. 1979. Determination that *Pediocactus peeblesianus* var. *peeblesianus* is an endangered species. Federal Register 44: 61922-61924.
- USDI, Fish and Wildlife Service. 1984. Peebles Navajo Cactus (*Pediocactus peeblesianus* (Croizat) L. Benson var. *peeblesianus*) Recovery Plan. U.S. Fish and Wild Service, Albuquerque, New Mexico. 58 pp.
- USDI, Fish and Wildlife Service. 1996. Subpart C-Appendices I, II, and III to the Convention on International Trade in Endangered Species of Wild Fauna and Flora; Species listed in Appendices I, II, and III. P. 20.
- USDI, Fish and Wildlife Service, International Affairs. Web abstract – *Pediocactus peeblesianus*, Peebles Navajo Cactus. Accessed 12/10/2003 from <http://international.fws.gov/animals/pedipeeb.html>.
- USDI, Fish and Wildlife Service, Arizona Endangered Species Office. Abstract and photo of Peebles Navajo Cactus (*Pediocactus peeblesianus* var. *peeblesianus*). Accessed: 12/10/2003 from <http://arizonaes.fws.gov>.

MAJOR KNOWLEDGEABLE INDIVIDUALS:

- John Anderson – BLM State Botanist, State Office, Phoenix, Arizona.
Reggie Fletcher - USFS Regional Ecologist, Albuquerque, New Mexico.
Dr. Art Phillips III - Private Consultant, Flagstaff, Arizona.
Dr. Barb Phillips - USFS Zone Botanist, Coconino National Forest, Flagstaff, Arizona.

ADDITIONAL INFORMATION:

Revised: 1998-09-11 (DJG)
2004-01-22 (SMS)
2009-01-05 (SMS)

To the user of this abstract: you may use the entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= **year of last revision as indicated at end of abstract**). X...X (= **taxon of animal or plant**). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.