



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

**Plant Abstract**

**Element Code:** PDCAC0E010  
**Data Sensitivity:** YES

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Pediocactus bradyi*  
**COMMON NAME:** Brady Pincushion Cactus, Brady's Plains Cactus  
**SYNONYMS:** *Toumeyia bradyi* W.H. Earle  
**FAMILY:** Cactaceae

**AUTHOR, PLACE OF PUBLICATION:** Benson, L. 1962. Cactus and Succulent Journal 34:163-168.

**TYPE LOCALITY:** Near Marble Canyon of the Colorado River, Coconino County, Arizona.

**TYPE SPECIMEN:** POM 16807. Benson, E.L. and L. Benson. 21 April 1961.

**TAXONOMIC UNIQUENESS:** Eight species of *Pediocactus*, defined primarily by unique capsule dehiscence, occurring from the Columbia River Basin, Great Basin, Rocky Mountains and Colorado Plateau. Seven of these species, including *P. bradyi*, are restricted endemics. *P. winkleri*, a rare cactus from Wayne County, Utah (200 km (33 miles) to the north), is the closest relative to *P. bradyi*. *P. winkleri* has peach-colored flowers and fewer radial spines (9-11) which are less pectinate than *P. bradyi*. There are no recognized varieties of *P. bradyi*.

**DESCRIPTION:** Small cactus of one or sometimes two semiglobose stems, to 6.5 cm (2.6 in.) long, and to 5.0 cm (2.0 in.) wide. **Areoles elliptic** and densely white or yellow-villous. Usually **no central spine**, but rarely 1 or 2. **Radial spines 14 to 15**, each 3.0-6.0 mm (0.12-0.23 in.) in length, white or yellowish, smooth, cartilaginous, semi-flexible (not sharp) and somewhat pectinate (comb-like with closely set teeth or divisions). Flowers straw-yellow in color, to 2.5 cm (1.0 in.) in diameter. Fruit green and top-shaped, the base constricted into a short stalk; turning brown at maturity.

**AIDS TO IDENTIFICATION:** Young individuals of *Coryphantha vivipara*, especially in the 10.0-20.0 mm (0.4-0.8 in.) diameter range, may resemble *P. bradyi*. These small *C. vivipara* have 10 to 25 radial spines. The greater number of radial spines give *C. vivipara* a matted appearance which distinguishes it from *P. bradyi*. The red to brown central spines characteristic of larger *C. vivipara* are lacking in small individuals.

**ILLUSTRATIONS:** B&W photo (Benson 1962: Fig.108, p.167).  
B&W photo (Benson 1982: Fig.791, p.756).  
Line drawing (Benson 1982: Fig.792, p.757).  
B&W photo (Benson 1982: Fig.793, p.757).  
B&W photo (Benson 1982: Fig 794, p.757).  
Line drawing (USFWS).

**TOTAL RANGE:** Marble Canyon, Coconino County, Arizona. Scattered populations along both sides of the rim of Marble Canyon and tributary canyons for a distance of about 40 km (25 miles), from below Lee's Ferry to the vicinity of Bedrock Canyon on the west side of Marble Canyon, to Tanner Wash on the east side of Marble Canyon, Coconino County, Arizona. Plants may be found from one to three miles from canyon rims. Total potential habitat has been estimated to be 17,000 acres, though only 10-20% appears to be occupied.

**RANGE WITHIN ARIZONA:** See "Total Range."

## **SPECIES BIOLOGY AND POPULATION TRENDS**

**GROWTH FORM:** Globose Succulent Perennial

**PHENOLOGY:** Flowers late March to April; fruits mature late May to early June.

**BIOLOGY:** Flowers and fruit are produced by plants over 15 mm in diameter. Larger stemmed plants are more likely to produce multiple flowers; up to five flowers have been observed on one stem (Spence 1992). On sunny days, flowers open mid-morning and close in the evening, and may open for four or five successive days (Spence 1992). A mature fruit may contain 15 seeds; the total number of seed produced by a single plant over its life is relative small. Hughes (1991) found that up to 76% of monitored adult plants produced fruit in some years; the lower the precipitation during the months preceding fruiting, the lower the fruit production. Recruitment dropped during the dry years of 1988 and 1990. Under cool temperatures and wet conditions, the *P. bradyi* is highly susceptible to root rot. Hughes (1991) stated that depredation by rodent herbivory is the single largest killer of the cactus, especially under drought conditions. Drought and frost heaving has contributed to loss of some plants. The plants retract into the soil in response to drought conditions and enter dormancy (generally by the end of May to early June).

Preliminary data from Vince Tepidino (USDA Bee Lab, Logan, Utah) suggests that *P. bradyi* is self-incompatible and that flowers are insect pollinated. Spence (1992) has found that flowers are primarily pollinated by native bees.

Mycorrhiza are associated with the roots of this cactus. The fungus is acquired from the parent plant (the seed germinating immediately alongside the parent plant) or from the roots of grasses.

**HABITAT:** Grows in gravelly alluvium on gently sloping benches and terraces with very specific soil characteristics; with sparse vegetation characterized by scattered low shrubs (*Atriplex*, *Gutierrezia*, *Ephedra*) grasses (*Bouteloua*, *Sporobolus*), and annuals (*Sphaeralcea*, *Eriogonum*).

**ELEVATION:** 3,400 - 5,200 ft. (1,037 - 1,586 m)

**EXPOSURE:** Open, exposed, sunny situations; gently sloping (0-10°); generally north-facing.

**SUBSTRATE:** Kaibab limestone chips overlaying soil derived from shale, mudstone, and siltstone of the Moenkopi Formation. Chert and quartz pebbles eroded from the Shinarump Conglomerate Member of the Chinle Formation are also present at some sites. No distinct soil type, as discerned from BLM soil surveys, is peculiar for the cactus.

**PLANT COMMUNITY:** Great Basin Desertscrub. Associated plants include shadscale (*Atriplex confertifolia*), snakeweed (*Gutierrezia sarothrae*), and Mormon tea (*Ephedra viridis*) (NatureServe 2001).

**POPULATION TRENDS:** Populations are very local and discrete. Clay May has estimated there may be approximately 10,000 individual plants. Hughes (1991) found that all monitored plots were dominated by larger individuals. The BLM Badger North monitoring plot was vandalized in 1991. Plants were removed and dislodged from the ground.

The densest populations occur along the rims of Soap Creek and Rider Canyon, and nearby portions of the rim of Marble Canyon. The occurrence at Bedrock Canyon, located by Clay May in 1983, has not relocated by BLM (Hughes 1991).

The population at Glen Canyon NRA has not been fully surveyed, though Spence (1992) estimates the population to exceed 1,000 individuals.

**SPECIES PROTECTION AND CONSERVATION**

|                                       |  |
|---------------------------------------|--|
| <b>ENDANGERED SPECIES ACT STATUS:</b> | LE (USDI, FWS 1976)<br>[PE USDI, FWS 1975]   |
| <b>STATE STATUS:</b>                  | Highly Safeguarded (Arizona Native Plant Law, 1993)  |
| <b>OTHER STATUS:</b>                  | Not Forest Service Sensitive (USDA, FS Region 3 1999)<br>[Forest Service Sensitive USDA, FS Region 3 1990]<br>Group 2 (NNDFW, NESL 2000, 2005) |

**MANAGEMENT FACTORS:** Highly desired for its ornamental value in the cactus and succulent trade, but very difficult to cultivate. Highway maintenance and road alignment (US 89A) has affected at least one population. Livestock grazing has had local impacts due to trampling. Additional threats include off-road vehicles and impacts from dispersed recreation. Threats from mining activities (including uranium leasing) appears minimal at this time (no active claims within the Marble Canyon ACEC as of 1994).

**CONSERVATION MEASURES TAKEN:** Federal and state laws against collection.

BLM has established permanent monitoring plots beginning in 1980 and others since 1984; as of 1992 there are four BLM monitoring plots: North Canyon, Badger North, Soap Creek and Badger South. BLM Habitat Management Plan completed in 1986. Marble Canyon Area of Critical Environmental Concern (ACEC) has been designated by BLM, January 1992, with a management plan and formal consultation with Fish and Wildlife Service completed in 1994 (USBLM 1993; USFWS 1994).

Surveys were conducted on the Navajo Nation in 1991 and 1992. Monitoring plots established in 1991 by the Navajo Natural Heritage Program at Jackass Canyon.

Monitoring plots established in 1992 (Spence 1992) at Glen Canyon National Recreation Area, NPS.

Plant pollination ecology studies were conducted by Vince Tepidino of the USDA Bee Lab, Logan, Utah, during 1991 and 1992 (final report expected in 1994).

Grand Canyon NP has scheduled surveys for 1992.

**SUGGESTED PROJECTS:** Determine physiological factors which limit distribution.

Investigate relationship of plant occurrence and soil characteristics, including soil texture and chemistry. More data on seed germination and seedling establishment are needed. Conduct a detailed analysis of demographic data from long-term monitoring plots. Continue BLM, NPS and Navajo Natural Heritage Program monitoring plots. Determine levels of and reduce illegal collection. Additional surveys are needed, especially in the vicinity of Bedrock Canyon/South Canyon (the only potential habitat on the Kaibab NF is the south side of South Canyon; the north side of the canyon is BLM), on the Navajo Nation, and Glen Canyon NRA.

**LAND MANAGEMENT/OWNERSHIP:** BIA - Navajo Nation; BLM - Arizona Strip Field Office; NPS - Glen Canyon National Recreation Area.

**SOURCES OF FURTHER INFORMATION****LITERATURE CITATIONS:**

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**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

- Lee Hughes - BLM, Arizona Strip Field Office, St. George, Utah.
- Clay May - Pima College, Tucson, Arizona.
- Barbara Phillips - Zone Botanist, USDA Forest Service, Flagstaff, Arizona.
- John Spence - NPS, Glen Canyon National Recreation Area, Page, Arizona.
- Vince Tepidino - USDA, Agricultural Research Service, Bee Lab, Utah State University, Logan.

**ADDITIONAL INFORMATION:**

Criteria for downlisting to threatened was established in the recovery plan (1985). This calls for permanent protection of 75% of the known habitat.

Heil et al. speculated that *P. bradyi* may have occurred further to the northeast along the Colorado River, but Glen Canyon Dam and the filling of Lake Powell behind it would have destroyed any populations that might have occurred there.

**Revised:** 1991-12-12 (JSP)  
 1992-05-28 (BGP)  
 1992-09-14 (BKP)  
 1994-03-23 (BKP)  
 1997-10-23 (SMS)  
 2001-12-26 (SMS)

**AGFD Plant Abstract**

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*Pediocactus bradyi*

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