

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

Plant Abstract

Element Code: PDROS1E030

Data Sensitivity: No

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Purshia subintegra*
COMMON NAME: Arizona Cliffrose, Burro Creek Cliffrose
SYNONYMS: *Cowania subintegra* Kearney
FAMILY: Rosaceae

AUTHOR, PLACE OF PUBLICATION: Henrickson, J. 1986. *Phytologia* 60(6):468. (Synonym *Cowania subintegra*: Kearney, 1943. *Madroño* 7:15).

TYPE LOCALITY: Two miles west of Burro Creek, K crossing on road from Wikieup to Hillside, southeastern Mohave County, near Yavapai County line, Arizona.

TYPE SPECIMEN: Darrow and Cooks 3, and Darrow and Benson 10890. 18 April 1941.

TAXONOMIC UNIQUENESS: *Purshia subintegra* is closely related to *P. ericaefolia* Torr. of the Trans-Pecos region of Texas. Both species occupy similar habitat and have similar characteristics. Characteristics of *P. subintegra* are: glandularity, tomentosity, grey bark, bushiness and color of young twigs. In the Verde Valley, the range of *P. subintegra* overlaps with the more common cliffrose, *Purshia stansburiana* (Torr.) Henrickson, and introgression or hybridization occurs (Baggs and Maschinski date unknown, accessed 2001). Kartesz (1994) treats *P. subintegra* as a hybrid.

DESCRIPTION: Low, straggling woody shrub, 1 - 2 m (3 - 6 ft.) in height, usually less than 1.0 m (3.3 ft) high. In the Cottonwood population, plants can reach a maximum of 2.4 m (8 ft.) and 3.7 m (12 ft.) in diameter (USFWS, Recovery Plan 1995). Base of stem 3.0 - 5.0 cm (1.2 - 2.0 in.) diameter; stems are more or less persistently woolly; bark ashy gray on older branches (becomes shreddy), while new shoots tend to be red-brown and pubescent with a red dot below fascicle. **Leaves narrow, short, and entire**, but occasionally has 1 or 2 rounded, shallow lobes below the leaf tip; **not gland-dotted or sticky**, margins revolute. The upper leaf surface is usually loosely arachnoid-pubescent, but may be hairless. The lower leaf surface is densely white-lanate. Flower about 10.0 mm (0.4 in.) diameter, with 5 white or pale yellow petals, born on a single peduncle. Pistils are 3 - 7. Fruit an achene with long 2.0 cm (0.8 in.) plumose persistent styles (tails). **Young twigs and leaves are tomentose.**

AIDS TO IDENTIFICATION: The only other *Purshia* likely to occur in the areas where *P. subintegra* may be found is *Purshia stansburiana*. The latter species is a tall, erect shrub up to 7.6 m (25 ft.) in height, and has leaves that are usually 3 - 5 lobed (deeply lobed). Leaves (hairless) and young twigs are glandular (sticky), and young twigs are red, not tomentose. *Purshia subintegra* is more graceful, more open and shorter.

ILLUSTRATIONS: Drawings of leaf (Benson and Darrow, 1981: p.273).
Line drawing (USFWS).
Color photos (<http://www.naturesongs.com/vvplants/azcliffrose.html>)

TOTAL RANGE: Endemic to Arizona.

RANGE WITHIN ARIZONA: Central Arizona: Near Horseshoe Lake, Maricopa County; near Cottonwood, Yavapai County; near Burro Creek, Mohave County; and near Bylas, Graham County.

SPECIES BIOLOGY AND POPULATION TRENDS

GROWTH FORM: Woody perennial.

PHENOLOGY: Flowers from late March through early May. Fruit dispersal occurs during the summer, when the summer rains dislodge seeds from the plants (USFWS, Recovery Plan 1995). Timing of seed germination and seedling establishment is unknown. Arizona Cliffrose plants appear to be long-lived and capable of a large reproductive output, however, it is not yet known what recruitment rates are necessary to maintain population viability. Recruitment rates appear to vary among populations. According to Denham and Forbes (1992) in USFWS, Recovery Plan (1995), areas within the Cottonwood population have been discovered to support a relatively large number of established seedlings. The other three Arizona Cliffrose populations do not appear to have sufficient recruitment.

BIOLOGY: Plants vary considerably in size, though this is not an adequate criterion for determining different age classes. Per Fitts et al (1993), "flowers may be pollinated on any of the first three days following anthesis (flower opening), ...and are mainly pollinated by bees." They are primarily cross-pollinated, but are partially self-compatible. Self-pollinated flowers produce significantly few seeds. Propagation by stem cuttings has been tried, but methods are not well developed.

HABITAT: Rolling, rocky, limestone hills and slopes within Sonoran Desertscrub. The species occurs where the winters are mild, summers are hot, and the 22.9 - 86 cm (9 - 34 in.) of rainfall is evenly distributed between summer and winter rainfall periods. The landscape is dissected by ephemeral drainages and is sparsely vegetated.

ELEVATION: 2,120 to 4,000 feet (647 - 1220 m).

EXPOSURE: All exposures; 0 - 40% slope.

SUBSTRATE: Species requires white Tertiary (Miocene and Pliocene) limestone lakebed deposits high in lithium, nitrates, and magnesium. Tonto and Verde Basins.

PLANT COMMUNITY: A unique plant community occurs on these limestone soils. *Purshia subintegra* tends to be the dominant or co-dominant shrub. All four known sites can be considered part of the *Larrea tridentata* - *Canotia holocantha* (Creosotebush - Crucifixion thorn) Association of the Arizona Upland Subdivision of the Sonoran Desertscrub (Brown 1982 in USFWS, Recovery Plan 1995). Other dominant woody species at more than one site include: *Aloysia wrightii* (Wright lippia), *Baileya multiradiata* (desert marigold), *Berberis haematocarpa* (red barberry), *Caenothus greggii*, *Dalea formosa* (feather plume), *Dyssodia acerosa* (dogweed), *Eriogonum fasciculatum* (flat-topped wild buckwheat), *Eriogonum inflatum* (desert trumpet), *Fouquieria splendens* (ocotillo), *Glossopetalon spinescens*, *Gutierrezia sarothrae* (snakeweed), *Krameria parvifolia* (little-leaved rattany), *Melampodium leucanthum* (Plains blackfoot daisy), *Oryzopsis hymenoides* (Indian ricegrass), *Parthenium incanum*, *Simmondsia chinensis* (jojoba), *Tiquilia canescens* (shrubby coldenia), and *Ziziphus obtusifolia* (gray-thorn).

POPULATION TRENDS: Four disjunct populations of Arizona Cliffrose, exist along a 322 km (200 mi) wide area of central Arizona. The Cottonwood population includes the greatest number of individual plants, including seedlings.

The Bylas site extends over a few sections of land. Nothing is known about livestock grazing management within Arizona Cliffrose habitat on the San Carlos Indian Reservation (USFWS, Recovery Plan 1995). However, Bingham (1977) noted a contrast of reproduction of *P. subintegra* near Bylas between the ungrazed highway right-of-way and the remaining area which was grazed. Juvenile plants occurred along the right-of-way, while on the grazed area no young plants were found in an hour of searching.

SPECIES PROTECTION AND CONSERVATION

ENDANGERED SPECIES ACT STATUS: LE (USDI, FWS 1984), without Critical Habitat.
STATE STATUS: Highly Safeguarded (Arizona Native Plant Law, 1993).
OTHER STATUS: Forest Service Sensitive, USFS Region 3, 1990.

MANAGEMENT FACTORS: Few populations, habitat-specificity, and threats make this species vulnerable. Threats include: browsing by livestock and burros, poor reproduction, mineral exploration and development, construction and maintenance of roads and utility corridors, recreation, off-road vehicle (ORV) use, urbanization, pesticides, and inundation (USFWS, Recovery Plan 1995). The relative importance of each of these threats varies from population to population.

The occurrence at Lime Creek, near Horseshoe Reservoir, may be threatened by increased recreation resulting from the development of a Forest Service recreation area associated with modifications at Horseshoe Dam.

CONSERVATION MEASURES TAKEN: The main Burro Creek population was completely enclosed with a barbed wire fence to exclude burros and cattle in spring, 1989. The two smaller subpopulations are lightly grazed, and have been under a monitoring system since 1992. Monitoring transects were established in the Cottonwood population in 1987, along with a highly managed livestock grazing plan that includes a deferred rest rotation system. One of the subpopulations within the Horseshoe Lake Populations, is on a 5-pasture rest-rotation system, grazed every other year. Area of Critical Environmental Concern has been designated on one square mile at Burro Creek population. Verde Valley Botanical area was established in 1987.

Various methods have been employed to help resolve the taxonomic questions regarding hybridization of *P. subintegra*. The combined results of starch gel electrophoresis, and morphometric and genetic (DNA) studies are available in the 1995 Recovery Plan.

Recovery Criteria: Includes the maintenance of four viable populations, protection of sufficient quantity and quality of habitat needed to support viable populations, regulatory mechanisms or written land management commitments that provide for long-term protection, and determination that the species no longer is endangered (USFWS, Recovery Plan 1995).

SUGGESTED PROJECTS: Refine species description through further investigations. Additional state-wide surveys should be conducted to refine the range of the species. Develop and implement a monitoring program to determine the population dynamics of each recovery unit. Describe the life history characteristics of the species. Develop or refine propagation techniques. Describe pollination biology and ecology and determine the identity and role of other insects affecting Arizona Cliffrose. Initiate research on effects of season of livestock grazing and duration of grazing on the growth and reproduction of Arizona Cliffrose. Enlarge Verde Valley Botanical Area, to include potential habitat. Designate a Botanical Area or equivalent management area for the Horseshoe Lake population.

LAND MANAGEMENT/OWNERSHIP: BIA - San Carlos Reservation; BLM - Kingman Field Office; USFS - Coconino, Prescott and Tonto National Forests; State Land Department; Private. Possibly Bureau of Reclamation; Arizona State Parks (Dead Horse Ranch State Park).

SOURCES OF FURTHER INFORMATION

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- S. Bingham - Eastern Arizona College, Thatcher.
- Bob Denham - Cottonwood, Arizona.
- Donald Koehler - University of California, Santa Barbara.
- Barbara Phillips - U.S. Forest Service Zone Botanist, Flagstaff, Arizona.
- Donald Pinkava - Arizona State University, Tempe.
- Frank Reichenbacher - Southwest Field Biologists, Tucson, Arizona.

ADDITIONAL INFORMATION:

FWS decided all individuals showing *P. subintegra* characteristics would be protected pending decisions on taxonomy.

Electrophoretic work by Phillips and Phillips (1987) found no differences between *P. subintegra* and *P. stansburiana*.

Morphometric analysis by Reichenbacher (1989) found insignificant differences between populations of *P. subintegra* but found significant differences between *P. subintegra* and *P. stansburiana*. Discriminant analysis and principle components analysis clearly separated *P. subintegra* from *P. stansburiana* populations, indicating morphologic distinctness of the two species.

Further morphometric analysis (Reichenbacher 1994) segregated out two hybrid groups, *Purshia* "Tonto," and *Purshia* "Verde." The "Tonto" group is generally found in Gila County on lakebed deposits around Roosevelt Lake in the Tonto Creek Basin. The Camp Verde collection site (about 4 miles southeast of Camp Verde) is included in the "Tonto" group. Introgessants in the vicinity of Cottonwood and all other Verde Valley hybrids (except the Camp Verde site) are included in the "Verde" group.

Bob Denham, a volunteer from Cottonwood, compiled a detailed map of the distribution of *P. subintegra* in the Verde Valley, 1991-1992.

Intermediate types of *P. subintegra* occur along Highway AZ 77 between Globe and Winkelman.

In a common garden study conducted by Baggs and Maschinski (date unknown, accessed 2001), the morphological and growth differences of *P. subintegra*, *P. stansburiana*, and the introgressed form across a soil gradient were examined. The soil gradient consisted of soil from 3 habitats: undisturbed limestone outcrops where *P. subintegra* grows, disturbed limestone roadsides where the introgressed forms grow, and a wash where *P. stansburiana* grows. Each species grew best in the soil from its habitat.

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