

## Two Rare Plants of the Arizona Strip

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*Walking along the Kanab Creek Rim far from areas of human endeavor, the ecologist is studying the ground, rim areas, and bushes. Days of searching have yielded nothing. He is seeking a thorny self-protecting bush, which, once found and touched, makes one wonder if the world would be better without its spiny existence. But the searcher is obsessed with finding this plant. It is rare, and the search enriches his life. For the ecologist the discovery of this plant is like finding a lost gold mine.*

The Arizona Strip is a remote area directly north and west of the Grand Canyon, which is vast, largely uninhabited, and lightly visited. Its rough roads seem to lead only to more-remote areas. Possibly because the Strip is so remote, it harbors scarce plants; four are listed as endangered or threatened and eight others are designated sensitive or candidates for listing. There may be other rare plants which remain undiscovered.

Experts debate the reasons plants become so scarce that they need protection to survive. Three factors may explain why species are threatened with extinction: (1) evolutionary processes, (2) human-induced impacts, and (3) limited distributions and small populations.

In monitoring areas of the Arizona Strip, two rare species have caught my attention. One is listed under the Endangered species Act and the other is a candidate for listing. An investigation of these two species is warranted because they don't appear to be increasing in numbers. Although extinction is not imminent, it is becoming a possibility.

### A Rose on the Rim (Figure 1, p. 27)

Along the rims of Kanab Creek Canyon and the Grand Canyon grows a plant with intimidating thorns custom made for the crucifixion crown; it is a rose, *Rosa stellata* Wootton subspecies *abyssa* A. Phillips. Phillips (1992) described the habitat and distribution of this rose, "...from Mesa Eremita on the South Rim of the Grand Canyon, and from Twin Point, Dutton Point, between Hades Knoll and SB Point, and West rim of Kanab Canyon, N(North) of the Grand Canyon. All known populations are on or near canyon rims or the tops of cliffs at the edges of mesas or plateaus, suggesting the subspecific epithet." Phillips continued, "The Twin Point popu-

lation is the largest known, consisting of 1000-2000 stems in a 10,000 meter square area." Phillips described the Twin Points substrate as thin sandy-gravelly soils with limestone pebbles, overlying the Kaibab limestone bedrock in an open Great Basin conifer woodland with *Juniperus osteosperma*, *Purshia stansburiana*, *Ephedra nevadensis*, and *Yucca baccata*. Phillips then described what I have also found in working with the *Rosa stellata* populations: "Although the edge of the population was abrupt, there was no apparent corresponding change in habitat. No additional populations were found on Twin Point or on nearby Kelley Point in similar areas."

Populations of this canyon rose have been sought for 20 years. In 1977-79 Ralph Gierisch, an ecologist with the Bureau of Land Management, and Art Phillips found three small populations along the west rim of Kanab Canyon north and south of the Kanab North Uranium Mine. In the 1980s I conducted transects to locate new populations. In a documented search, I walked for 13 days on the east and west rims of Kanab Canyon but had no luck. Undocumented searches also found none of this species. In addition, at different times of the year between 1986 to 1990, I searched depressions where the Timpoweap Member of the Moenkopi Formation occurred on rim areas.

In 1989, after many searches with no new finds, I found a small depression like so many other places along the Kanab Rim. It was in a pinyon-juniper woodland at a site overlooking Chamberlain and Kanab canyons, not far from Kanab Point, where Kanab Creek flows into the Colorado River. The scenery was so stunning I could hardly keep my eyes on the ground. There in the small depression was a stringer of red-leafed rose bushes, a little more than 25 feet long running to the canyon rim. No more plants grew nearby. That was the extent of the small population.

Robert Sandberg, a BLM range conservationist, found another population on the east side of Kanab Canyon at Clearwater Spring Point in 1993. This is a small population covering an area 30 square feet. Like the other populations, and as Phillips (1992) stated, the population ended "abruptly."

### Monitoring

In 1987 I set up a monitoring plot south of the Kanab North Mine at the section 29 population in T38N R3W. This was a good-sized population in a small canyon. The trend plot is 100 feet long and 30 feet wide at one end and 18 feet wide at the other end.

I tagged clumps of stems – or a stem that can be defined as appearing separate from others – measured the height of the clump in general or the height of the stem taken, and counted the number of hips.

The trend data for 1990 and 1996 and the years between (Table 1) shows the clumps shifting around in the size classes and

in the number of hips. The number of hips and clumps or stems depends on the precipitation during the months before monitoring. During drought some clumps seemed to die back to the ground. With precipitation, clumps resprouted. But the roses at all sites, which are observed every year, do not seem to expand in area occupied. The Water Canyon Point population has been mapped every year since 1989, and the canyon rose has not extended beyond its original boundaries. Because the seeds appear to be sterile, seed viability will be tested by the staff of the Flagstaff Arboretum.

The populations of this rose are stable and increase and decrease in vigor and quantity depending on moisture received in the area of occupation. However, the area of occupation stays about the same.

#### A Cyclad in Purple (Figure 2, p. 27)

The second species studied grows in a loose purple soil sloping steeply to washes in two canyons just west of the Kaibab Indian Reservation near Cane Beds, Arizona. The purple soil is of the Chinle Formation in the Moenkopi. The plant's name is *Cycladenia humilis* Benth. var. *jonesii* (Eastw.) Welsh and Atwood, commonly called the Jones cyclad. Welsh et al. (1987) described this plant as an "obligate gypsophile of semibarren tracts on geological formations with poor water relationships."

The Jones cyclad has fleshy, big leaves and a violet flower. Appearing to be more at home in the tropics than in the desert, it forms a long pod full of feathery seeds. Spence (1994) wrote that "The affinities of *Cycladenia* remain obscure, but it may be related to taxa in the neotropics of Mexico and Central America." Sipes et al. (1995) and Spence (1994) stated that the cyclad grows in clones with very little or no sexual reproduction. Sipes et al. (1995) further reported finding no seedlings at their study sites in searches from 1991-1994. Several factors might help explain why the cyclad does not sexually reproduce: a pollinator lost, the low sexual reproduction tradition of clonal plants, and the low fruit set and high fruit abortion characteristic of the dogbane family. Occurring at three other sites in Utah (Atwood et al. 1994), this plant is rare, and with its asexual ways, it probably won't be expanding in area.

In 1993 the Arizona Strip population west of Pipe Springs was found in a search by Duane Atwood and Ben Franklin, two Utah botanists. During this same year, I found some small scattered populations while inventorying Potter Canyon, east of Atwood and Franklin's population.

#### Monitoring

In 1993 I set up two 25- by 25-foot trend plots in the Atwood and Franklin population. In each monitoring plot I counted the number of ramets and categorized them into two groups: ramets with flowers and fruit and ramets without flowers and fruit. I also counted the total number of follicles. Readings of the monitoring plots four years in a row have found that

the clones seem to behave as Sipes et al. (1995) and Spence (1994) have found with their clones. The number of ramets, flowers, and the few follicles (seedpods apparently with even fewer live seeds) correspond to the amount of moisture received.

Spence (1994) stated that in monitoring, "Total numbers of ramets as well as changes in ramet numbers per group can give some idea of changes in the population and also survivorship of individuals."

The plots show findings similar to those of Sipes et al. (1995) and Spence (1994). Despite many ramets and flowers, the cyclad is not sexually reproducing. To quote Sipes et al. (1995), "Regardless of the cause, the low sexual reproduction observed in Jones cycladenia poses special concerns for its conservation. Because Jones cycladenia reproduces vegetatively, it may be persisting despite a loss of its original pollinator species. However, the infrequent (or nonexistent) recruitment of new individuals into populations makes each existing clone especially valuable to conservation efforts."

According to Spence (1994), "a much more immediate threat to the Jones cyclad is climate change. The species is an ecological specialist, found only within a narrow elevation range in scattered populations. Sexual reproduction is limited, and seeds are unlikely to be able to disperse between the widely scattered slopes of Chinle Deposits. Hence the species is extremely vulnerable to climate change. In the event of global warming, the most likely response of *Cycladenia humilis* var. *jonesii* in the Purple Hills is extinction."

#### Conclusion

With the future of both the canyon rose and Jones cyclad in a "going nowhere mode" due to low or no apparent sexual reproduction, a management plan is necessary.

On the Arizona Strip a resource management (land use) plan is being amended to address newly found listed plant species. This process may result in the designation of an area of critical environmental concern (ACEC) to protect the *Cycladenia humilis* var. *jonesii* population. The canyon rose is unlisted, and its widely scattered population makes an ACEC designation seem impractical. However, with such small areas of occupation these rose populations can be conveniently protected on a case-by-case basis if actions are proposed that might affect them. For both populations on BLM-administered lands, monitoring needs to continue to protect and keep the public aware and sensitive to the needs of these plants.

#### Literature Cited

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Figure 1. *Rosa stellata* ssp. *abyssa*

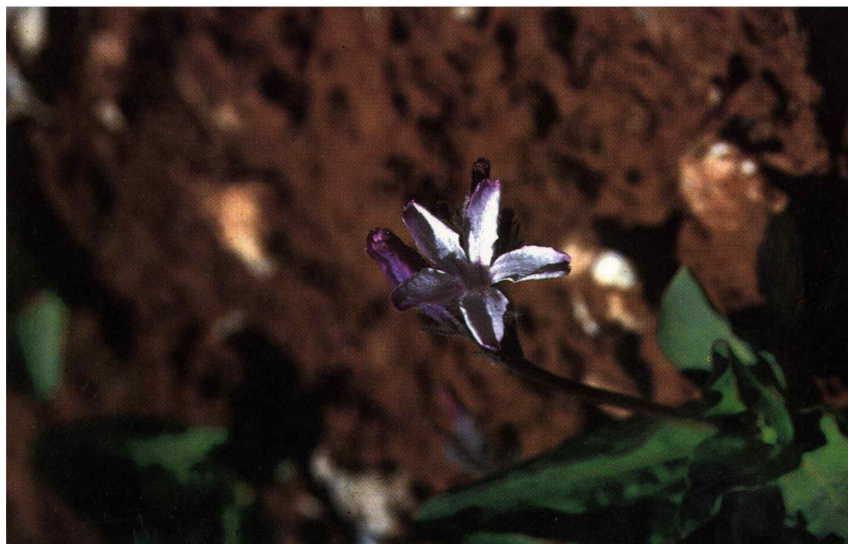


Figure 2. *Cycladenia humilis* var. *jonesii*