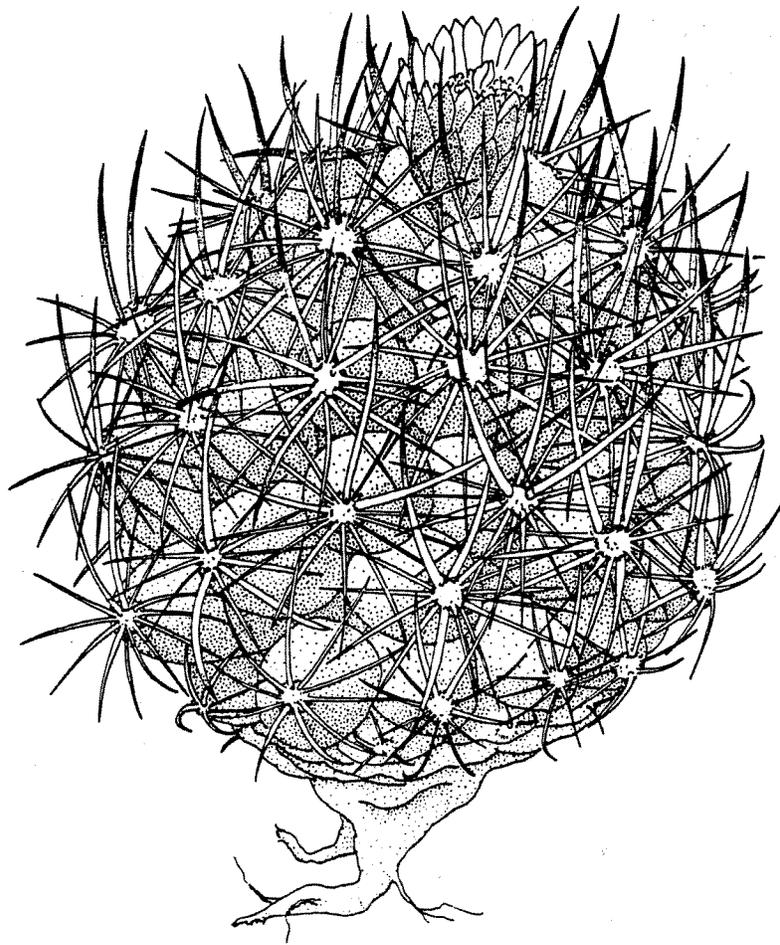


SILER PINCUSHION CACTUS

(*Pediocactus* *sileri*)

RECOVERY PLAN



U.S. Fish and Wildlife Service

Albuquerque, New Mexico

1986

RECOVERY PLAN FOR THE SILER PINCUSHION CACTUS

PEDIOCACTUS SILERI

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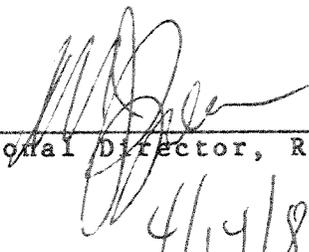
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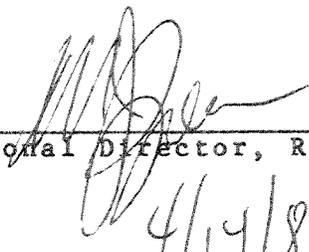
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U.S. Fish and Wildlife Service
Albuquerque, New Mexico

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Regional Director, Region 2

Date:


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DISCLAIMER

This is the completed Siler Pincushion Cactus Recovery Plan. It has been approved by the U.S. Fish and Wildlife Service. It does not necessarily represent official positions or approvals of cooperating agencies and does not necessarily represent the views of all individuals who played a role in preparing this plan. This plan is subject to modification as dictated by new findings, changes in species status, and completion of tasks described in the plan. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other constraints.

Literature Citations should read as follows:

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Mexico), Mr. Ken Heil (San Juan College, Farmington, New Mexico), range conservationists and geologists from the Bureau of Land Management, and botanists from the Washington Office of Endangered Species.

SUMMARY

- Goal: To remove the endangered Siler pincushion cactus from the Federal list of threatened and endangered species by managing its essential habitat to sustain natural populations in the wild.
- Recovery Criteria: The criteria for downlisting the Siler pincushion cactus to threatened will be to develop a habitat management plan (HMP) and mineral feasibility report; census and map known populations; administer mining claims; and establish monitoring plots. Criteria for delisting will be to demonstrate long-term stability in population levels, implementation of HMP, suitability of downlisting actions, and continued assurance of no mineral threats.
- Actions needed: Major steps to meet the recovery criteria include: The development and implementation of habitat management plans that alleviate the threats of collecting and habitat modification; the enforcement of existing regulations on collecting and trade; the study of population biology to develop the understanding needed to sustain healthy populations in their natural habitat; and, the development of public awareness, appreciation and support for preservation of the Siler pincushion cactus.

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PART I

INTRODUCTION

Brief Overview

The Siler pincushion cactus, Pediocactus sileri (Engelm.) L. Benson, was listed as endangered by the U.S. Fish and Wildlife Service on November 26, 1979 (44 FR 61786). The species is known from northwestern Arizona (Arizona Strip) and southwestern Utah, occurring in scattered populations between Fredonia, Arizona, and St. George, Utah. In 1979, Bureau of Land Management personnel carried out intensive searches which significantly increased the number of known populations and individuals. These studies were reported by Gierisch (1980, 1981) and Gierisch and Anderson (1980). In addition to Gierisch's work, Hughes (1985) continued to survey BLM lands in 1984 and 1985.

Two other members of the genus in Arizona, Pediocactus bradyi L. Benson and P. peeblesianus (Croizat) L. Benson var. peeblesianus, and one in New Mexico, P. knowltonii L. Benson, are also listed as endangered. Five members of the genus, P. despainii Welsh et Goodrich, P. papyracanthus (Engelm.) L. Benson, P. paradinei B.W. Benson, P. winkleri Heil, and P.

peeblesianus var. fickeiseniae (Backeberg) L. Benson, are listed in the 1985 notice of review (50 FR 39526) as candidates for listing under the Endangered Species Act. These pediocacti are narrow endemics, each occupying distinctive restricted habitats on the Colorado Plateau.

Siler pincushion cactus is threatened by adverse modification of its habitat due to potential mining activities, off-road vehicle use, grazing, and by direct loss of plants due to collecting (Phillips et al. 1979; Fletcher 1979; Benson, pers. comm.; Newland 1979, pers. comm.; U.S. Fish and Wildlife Service 1979).

This plan outlines the steps necessary to achieve and document long-term stability of Siler pincushion cactus populations in the wild by removing and preventing threats to the cactus and its habitat. Attainment of these goals will lead to the ultimate objective of removal of the Siler pincushion cactus from the Federal list of endangered and threatened species.

Taxonomy and Morphology

Pediocactus sileri was first collected by A.L. Siler in May 1883, at Cottonwood Springs and Pipe Springs. It was originally described by Engelmann as a species of Echinocactus (Coulter 1896), and was later placed in the genus Utahia by Britton and Rose (1922).

In 1961-62, Lyman Benson combined into the genus Pediocactus various species that formerly had been placed in six different genera due to their diversity in spination, body proportion, and flower color. This combination includes P. sileri. Benson recognized as an overriding similarity the structure and method of dehiscence of the fruits (dry at maturity and dehiscent usually both by a dorsal slit and a ring around the circumscissile apex), as well as several other common characteristics (Benson 1961, 1962). The pediocacti were considered by Benson (1962) to be the "keystone of the arch" in reclassifying the cactus genera of the United States. Pediocactus and a few other small genera are intermediate between Echinocactus, and two genera, Coryphantha and Mammillaria.

The Siler pincushion cactus is a small, solitary or occasionally clustered, globose cactus about 10 cm (4 inches)

tall (with exceptional specimens reaching 45 cm (18 inch) and 7.5-10 cm (3-4 inches)) in diameter. Each areole contains 3-7 brownish-black straight or slightly curved central spines, becoming pale gray or nearly white with age. There are, in addition, 11-16 whitish radial spines per areole. The central spines are about 2.5 cm (1 inch) long, the radials slightly less. Flowers are about 2.5 cm (1 inch) in diameter, with yellowish marginally scarious petals with maroon veins. Fruits are greenish-yellow, somewhat enlarged upwards, with scales toward the top. They are dry at maturity; seeds are gray.

Current Status

Past and Present Distribution and Abundance

It is assumed that the present and historic ranges of *Siler pincushion* are similar. Although it was discovered over 100 years ago, its location in a remote, infrequently studied area precluded the availability of much botanical information about the plant or its habitat and distribution until recent years.

Siler pincushion cactus grows mainly on low hills with outcrops of gray or red clay from several geologic formations. The main part of its distribution is in the

Great Basin Desert Scrub Biotic Community, with the higher elevation sites in Great Basin Conifer Woodland and Plains and Great Basin Grassland, and lower elevation sites in the Mohave Desert Scrub (Phillips et al. 1979). Vegetation types follow Brown and Lowe (1977).

The known geographic distribution of *Siler pincushion* cactus extends from southeast of Fredonia, extreme northwestern Coconino County, Arizona, west for about 70 air miles in north-central Mohave County, Arizona. It extends about 3 miles north into Utah in Washington and Kane Counties, and about 22 miles south into Arizona in Mohave County (Fig. 1) (Gierisch 1980).

Gierisch (1980) estimates the potential habitat at 20,250 ha (50,000 acres) in Arizona and 1,200 ha (3,000 acres) in Utah. This includes land managed primarily by the Bureau of Land Management, with smaller holdings by the Bureau of Indian Affairs (Kaibab-Paiute Indian Reservation), the States of Arizona and Utah, and private individuals. A survey in November 1979 of eight widely scattered localities comprising less than one percent of the potential habitat resulted in a count of 1,109 individual plants (Gierisch 1980). Gierisch (1980) notes the difficulty of obtaining accurate or realistic population estimates due to high variability in plant density and extent of the habitat. Hughes (1985) found

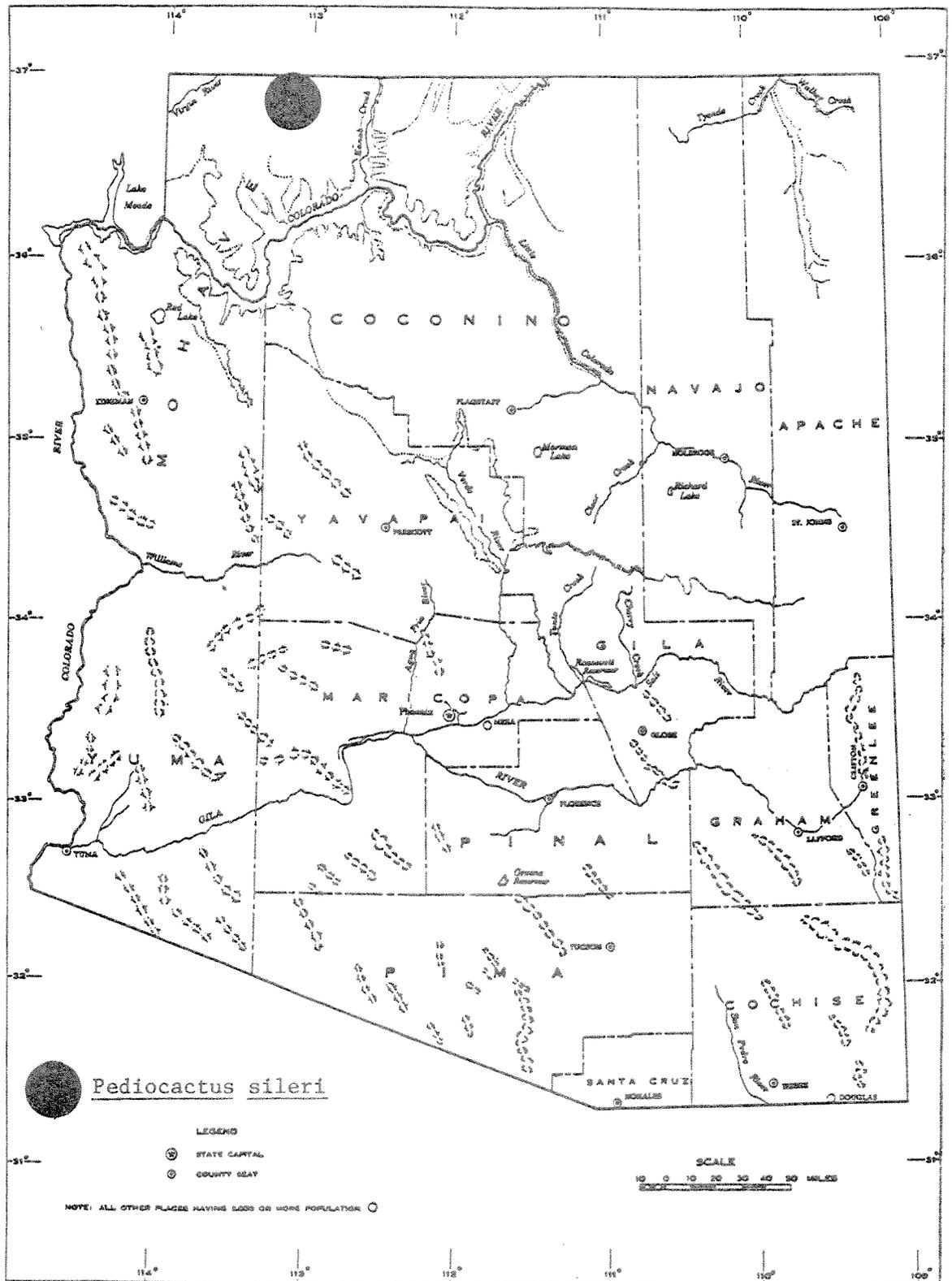


Figure 1. General location of Pediocactus sileri.

the density of Siler pincushion cactus to be highly variable and dependent on soil type with scarce to widely scattered populations occurring throughout most of the habitat. Densest populations are known to occur in an estimated area of only 4,100 acres. Data from surveys conducted in this 4,100 acre area indicate a total count of 7,033 cacti (Hughes, 1985).

Habitat

Siler pincushion cactus is found on gypsiferous and calcareous clay soils mostly derived from various members of the Moenkopi Formation. It is sometimes found on nearly identical-appearing members of the Chinle and Kaibab Formations, above and below the Moenkopi, respectively. The soils apparently are high in soluble salts and are usually white, although they are occasionally red if derived from one of the red members of the Moenkopi Formation (Phillips et al. 1979; Gierisch 1980).

Observations indicate that the plant is habitat specific and is not found on other soils. A detailed study of its habitat requirements has not been undertaken, and it is unclear why plants are not found in what appears to be favorable habitat.

The clay hills on which the plants are found form locally rolling topography, and often have a "badlands" appearance. Frequently, they support sparser vegetation than adjacent areas of different substrate. Siler pincushion cactus is found on all aspects of such hills, and is found on slopes varying from 0-80°. The known elevational range is from 850 to 1,650 m (2,800 to 5,400 feet).

Associated Species

As a result of its rather large elevational range and its substantial east-west geographic distribution, there is considerable variation from site to site in species associated with Siler pincushion cactus.

Dominant associated species include Atriplex confertifolia (shadscale), Atriplex canescens (four-wing saltbush), Artemisia tridentata (big sagebrush), Artemisia bigelovii (flat sagebrush), Gutierrezia sarothrae (snakeweed), Salvia dorrii (desert sage), Eriogonum corymbosum (shrubby wild buckwheat), Eriogonum microthecum (slender buckwheatbrush), Chrysothamnus spp. (rabbitbrush), and Ephedra spp. (Mormon tea). At higher elevation sites, associated species include Pinus edulis (Colorado pinyon), Juniperus osteosperma (Utah juniper), Cowania mexicana (cliffrose), and Yucca baccata

(banana yucca). At some low elevation sites, it is associated with Larrea tridentata (creosotebush) and Hymenoclea salsola (cheesebush). At one site in Washington County, Utah, it is found with Arctomecon humilis, a listed endangered species, and at other sites near Fredonia, Arizona, it occurs with the candidate species Eriogonum mortonianum and Eriogonum thompsonae var. atwoodii (Phillips et al. 1979; Gierisch 1980).

Impacts and Threats

At the time Siler pincushion cactus was listed as an endangered species, surface mining of gypsum deposits was considered a major threat. This was based on observation of significant levels of disturbance from mining or mineral exploration in several populations, especially near Fredonia, at the eastern edge of its range. Documentation of additional populations of Siler pincushion cactus since listing removes some of the immediate threat. Some of these populations are on gypsiferous substrate of low economic value, are in more remote localities, and are sufficiently numerous and scattered, so that some pressure is removed from the species by virtue of its having greater population numbers than originally believed. Formal documentation of long-term mining potential of the habitat (Mineral Feasibility Report,

Habitat Management Plan) remains to be developed before the degree of threat from gypsum mining and the needed level of mitigation of its impacts can be accurately assessed.

Since the plant was listed, an additional mining threat has surfaced on much of the Arizona Strip. Much of the district has been claimed by uranium mining companies. Two hundred and forty-six mining plans of operation (MPOs) have been filed in the BLM District Office; of these, 81 MPOs were within P. sileri habitat and 30 of the MPOs affected P. sileri. The potential for uranium mining, now and in the future, should also be addressed for the habitat of Siler pincushion cactus.

Habitat disturbance by off-road vehicles is an ever-increasing threat to habitat, particularly near urban areas, such as Fredonia, Pipe Springs/Moccasin, and St. George. Potential damage includes direct destruction of plants by off-road vehicles; and secondary loss of plants where trails become erosion channels during periods of heavy runoff. The rolling, sparsely-vegetated hills where the plants often occur are not only attractive sites for ORV use, they are also particularly susceptible to runoff. With increasing ORV recreational use of even more remote areas of the Arizona

Strip by residents of southern Nevada, southwestern Utah, and other more distant population centers, the long-term potential for disturbance must be considered seriously.

As with other species in the genus, this species is in worldwide demand by collectors of rare cacti. Removal of plants from the wild has occurred, and is an ongoing threat, according to those familiar with the cactus trade (Benson pers. comm; Newland 1979, pers. comm.). A recent analysis of the trade in U.S. cactus and succulents between 1982 and 1984 demonstrated that Pediocactus sileri was offered for sale in five catalogs for \$3-25. One of these catalogs specified field collected plants (Fuller 1985). The extent to which this has depleted, or is depleting populations of the Siler pincushion cactus is unknown. No monitoring data are available at present. Distribution of the species at numerous isolated locations over a relatively large area reduces the impact of collecting; however, at most sites the extent of the contiguous habitat is small, both increasing the vulnerability of large populations due to their density, and of small populations due to the potential of extirpation by removal of only a few plants. The degree of threat from collecting will remain a matter of speculation until monitoring studies are carried out.

Grazing is a threat mainly through the effects of trampling of plants by livestock. Small plants, particularly, are vulnerable in spring when the soil is muddy. Although the vegetation is sparse in most localities where *Siler pincushion* cactus occurs, making it a poor area for concentrated grazing, Gierisch (1980) lists several palatable plants as associated species, most notably *Oryzopsis hymenoides* (Indian ricegrass). Gierisch also notes that cattle and sheep have grazed the Arizona Strip area in far greater numbers over the past century than presently permitted. One of the densest *Siler pincushion* cactus populations studied by Gierisch was near a well with concentrated livestock use; however, he noted the tendency of plants to be located under shrubs and on gully slopes, where they were protected from trampling (Gierisch and Anderson 1980).

Natural factors certainly account for some mortality. Erosion on steep slopes after cloudbursts undoubtedly washes out plants in undisturbed habitat. Damage to roots, apical meristems, and fruits, due to rabbits, rodents, and insects, has been noted; in fact, Gierisch and Anderson (1980) noted greater mortality due to these causes than due to man-induced factors.

Restriction of the species to a specialized soil type and its distribution mostly as small, scattered, and disjunct

populations with a resultant restricted gene pool, are ecological factors which tend to intensify the effects of threats to the species and its habitat.

Management Efforts

Following the listing of Siler pincushion cactus in 1979, BLM personnel carried out searches and compiled data which significantly increased our knowledge and understanding of its distribution, numbers, and habitat (Gierisch and Anderson 1980; Gierisch 1980; Hughes 1985). However, these efforts, as well as previous searches, examined only a small percentage of the potential habitat. The demography of the plant remains uncertain. Much remains to be learned about its edaphic requirements, natural and man-influenced population fluctuations or stability, and abundance and distribution within its known range.

Legal Protection

Pediocactus sileri is on the Arizona State Protected list, Arizona Native Plant law, Arizona Revised Statute, Chapter 7, Sec. 3-901(B) as Utahia sileri. It is not to be collected except by permit for scientific or educational purposes. On July 29, 1983, Pediocactus sileri was placed on Appendix I of the Convention on International Trade in Endan-

gered Species of Wild Fauna and Flora (CITES), which requires permits from both the importing and exporting countries before shipment may occur. Only scientific trade benefitting the survival of the species is allowed.

The Endangered Species Act of 1973, as amended in 1982, prohibits the removal (from Federal lands) and reduction to possession of plants listed under the provisions of the Act. It is also prohibited for any person subject to the jurisdiction of the United States to sell, offer for sale, import, export, or transport in interstate or foreign commerce in the course of a commercial activity, any listed plant species. Under certain circumstances the Act also provides for the issuance of permits to carry out otherwise prohibited activities involving listed species.

The Lacey Act, as amended in 1981, also provides some protection for Siler pincushion cactus. Under this Act it is prohibited to import, export, sell, receive, acquire, purchase, or engage in the interstate or foreign commerce of any plant taken, possessed, or sold in violation of any law, treaty, or regulation of the United States, any Indian tribal law, or any law or regulation of any State.

Off-Road Vehicle Designation

Off-road vehicle (ORV) designations have not been made by BLM for the majority of areas where Siler pincushion cactus occurs. One area in proximity to a dense population of Siler pincushion cactus has been closed to ORV use; however, it still receives light use due to high ORV pressure on adjacent open land (Hughes 1985). BLM has stated that the difficulty in obtaining closures, and the potential adverse impact on the plant and its habitat due to publicity drawn by official notice and public meetings, could have a more serious effect on the plant than present ORV use.

Current BLM policy on ORV use is based on regulations published in the June 15, 1979, Federal Register (44 FR 34834). One of the more pertinent regulations reads:

"No person shall operate an off-road vehicle on public lands in a manner causing, or likely to cause significant, undue damage to or disturbance of the soil, wildlife habitat, improvements, cultural, or vegetative resources, or other authorized uses of the public lands;"

ORV designation work is normally done as part of the planning effort when it is identified as a management issue or concern, and will be an issue in the Arizona Strip District Resource Management Plan which will be developed in the near future. It will also be studied as part of the development of a Habitat Management Plan. If deemed necessary to prevent further, and remedy existing, resource damage, BLM can promulgate interim designations and emergency closures. Establishment of ORV regulations for Siler pincushion cactus habitat is subject to consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.

Range Situation

Livestock use on BLM portions of the range is relatively light, one animal unit per 200 acres per year, due to the low forage productivity of the habitat. Use is concentrated around areas of water development, of which the best example is Atkins Well. In this area, Gierisch and Anderson (1980) found evidence of damage to five plants from livestock at Atkins Well, and noted an unusually large proportion of plants in the area growing in the shrub understory or along gully slopes, where they were protected from trampling by livestock.

Propagation

Plant Resources Institute of Salt Lake City, Utah, carried out preliminary research on the tissue culture propagation of five species of Pediocactus in 1979. P. sileri was examined using seedling tissues. The procedure involves placing meristematic tissue (seedling tips or areoles) in an agar-based medium and culturing it for 6-8 weeks. Hormone levels are varied to achieve growth and cell multiplication. By six weeks, new buds are formed. The buds are removed and replanted; this is continued until the desired number of plants is obtained (Plant Resources Institute 1979).

The culture of seedling tissues was found to be more successful than tissues from mature plants. After buds have formed, the next step is to root the young cultured plants and transfer them from the growth chamber to the greenhouse. Rooting techniques and transfer procedures remain to be developed; Plant Resources Institute is not continuing the work due to withdrawal of BLM funds for the project. Member institutions of the Arizona Botanical Gardens Association, through their endangered species conservation program, have expressed an interest in acquiring and maintaining the plants.

Work on tissue culture of several Pediocactus species is being carried out in the Plant Genetic Engineering Laboratory for Desert Adaptation at New Mexico State University. This work is in its preliminary stages and thus far tissue culture of Siler pincushion cactus has not been attempted (Philip Clayton 1985, pers. comm.).

PART II

RECOVERY

Prime Objective

The prime objective is to manage the essential habitat of Pediocactus sileri so that healthy populations can be sustained in their natural habitat. Actions identified as necessary for meeting this objective and for downlisting to threatened are:

1. Develop an approved Habitat Management Plan (BLM) which includes steps to ensure protection of the species.
2. Develop a Mineral Feasibility Report (BLM) assessing the present and potential value of the habitat for mining of gypsum, selenites, and uranium.
3. Census and map (population size and area) known populations.
4. Administer mining claims within known populations, including mitigation of adverse effects, and Section 7 consultation when necessary.

5. Establish monitoring plots which can be relocated, and census on at least an annual basis.

Actions identified as necessary for meeting the prime objective and for delisting include:

1. Demonstrated long-term stability (or increase) in population levels and habitat through monitoring studies.
2. Suitability of downlisting actions demonstrated; plant stabilized in its habitat.
3. Continued assurance of no mining or new claims in known habitat.
4. Actions identified in Habitat Management Plan are implemented.

These criteria are to be evaluated for adequacy upon attainment and prior to delisting.

Step-Down Outline

1. Remove threats to Siler pincushion cactus by enforcement of existing regulations and by management for protection.

11. Protect populations on Federal lands.
 111. Enforce existing laws and regulations.
 112. Prepare and implement a Habitat Management Plan.
 113. Prepare Mineral Feasibility Report.
 114. Work with BLM to manage ORV use within populations.
 115. Manage livestock grazing.
 116. Special land designations.
 117. Develop understandings between BLM, BIA, and the Fish and Wildlife Service on management of Siler pincushion cactus.
 118. Monitor populations and habitat.
12. Protect populations on State and private lands.
 121. Enforce existing laws and regulations.

122. Develop understandings with States and individuals for protection and management of Silver cholla cactus populations on State and private lands.
 123. Develop and implement habitat management plans (HMP) for cactus populations on State and private lands.
 124. Monitor populations and habitat.
13. Develop a comprehensive trade management plan for all cacti.
 131. Develop a trade study.
 132. Develop a monitoring study to determine the impact of collecting.
 133. Determine feasibility of reducing collecting pressure on wild populations by promoting a commercial, artificial propagation program.
 134. Establish FWS policy on the commercial artificial propagation of endangered and threatened cacti.

135. Develop a Law Enforcement Strategy.
2. Study populations in their natural habitat at existing sites.
 21. Study the ecological requirements of the Siler pincushion cactus.
 211. Study the soil needs of the Siler pincushion cactus.
 212. Study the water needs of the Siler pincushion cactus.
 213. Study the role of biotic factors in Siler pincushion cactus ecology.
 2131. Herbivores.
 2132. Pollinators.
 2133. Other organisms.
 22. Study the population biology of the cactus.
 221. Life history requirements.

222. Monitor demographic trends.
23. Apply the results of studies under tasks 21 and 22.
 231. Determine environmental parameters defining and restricting habitat, and identify all potential habitat.
 232. Revise a habitat management plan for each area in which the plant is found.
24. Inventory suitable habitat to make an accurate estimate of occupied habitat, and number of plants in the wild. Determine land ownership if not already known.
3. Develop public awareness, appreciation, and support for preservation of Siler pincushion cactus. Enlist the support of public interest groups in its survival.
 4. Develop propagation techniques to provide nursery stocks in order to reduce collection pressure.
 41. Investigate various methods of propagation.
 42. Make propagation techniques known to nurserymen in order to provide plants for commercial trade.

43. Enlist the aid of botanical gardens in carrying out tasks 3 and 4.

Narrative

1. Remove threats to Siler pincushion cactus by enforcement of existing regulations and by management for protection.

Populations of Siler pincushion cactus should be protected by the enforcement of existing regulations and by application of existing management policies to remove threats to the species.

11. Protect populations on Federal lands.

Populations of Siler pincushion cactus on Federal lands occur primarily on land managed by BLM with smaller holdings by BIA (Kaibab-Paiute Indian Reservation). Actions necessary for downlisting can be accomplished by concentrating most effort on BLM managed land.

111. Enforce existing laws and regulations.

All existing regulations for the protection of threatened and endangered species on Federal lands need to be enforced. This includes the Endangered Species Act, CITES, the Lacey Act,

applicable State native plant laws, as well as all existing agency regulations on ORV use, grazing, mining, plant collection, etc.

112. Prepare and implement a Habitat Management Plan.

A Habitat Management Plan (HMP) should be written for populations of Siler pincushion cactus on BLM land. This document should contain procedures for protection of plants in balance with such activities as mining or mineral exploration, grazing, and ORV activities, and should outline steps for possible designation of significant portions of the range as Areas of Critical Environmental Concern (ACEC). Section 7 consultation should be done on the HMP. Implementation of a HMP is an essential step in delisting the Siler pincushion cactus.

113. Prepare Mineral Feasibility Report.

A Mineral Feasibility Report (MFR) should be prepared for populations of Siler pincushion cactus on BLM land. This should include evaluation of the probability of mining deposits of gypsum, uranium, and any other recoverable

minerals within the habitat. Economic feasibility and richness of the deposit should be addressed. The report should include best estimates of the feasibility of mining in the future, as well as the present. The preparation of a MFR is an essential step in formally assessing the threat of mining to Siler pincushion cactus and its habitat, and is a prerequisite to downlisting the species.

114. Work with BLM to manage ORV use within populations.

Full closure of all Siler pincushion cactus habitat to ORV use is not necessary or desirable. The many small, scattered parcels of habitat would be impractical to post or fence, and such closures would be impossible to enforce. The public involvement required would draw undue attention to specific localities. Instead, BLM should post signs at strategic localities informing the public of regulations prohibiting the operation of ORVs on public lands "in a manner causing . . . undue damage to . . . the soil, wildlife habitat, . . . or vegetative resources . . ." BLM enforcement officers should patrol critical areas on

a regular basis and strictly enforce these existing ORV regulations. Steps such as fencing should be taken in areas where incursion becomes serious. Consideration should be given to designating specific areas for ORV use if the demand for this type of recreation becomes high in significant sectors of Siler pincushion cactus range. Development of a plan to control ORV use in Siler pincushion cactus populations should be included in a Habitat Management Plan, the implementation of which is an essential step for delisting.

115. Manage livestock grazing.

Livestock grazing can have definite negative impacts on the Siler pincushion cactus through trampling. A grazing management plan should be prepared for the allotments containing habitat for this cactus, and Section 7 consultation should be done on that plan. Such a plan should include the elimination of spring (March-May) grazing on Siler pincushion cactus habitat because small plants are particularly vulnerable when the ground is muddy during these months, and complete elimination of

grazing from certain areas of known high density cactus populations, probably by use of enclosure fencing. In addition, the plan should carefully address the effects of range facility placement in Pediocactus sileri habitat (i.e., water tanks, salt sources, fences, etc.) and should not allow the use of the Savory grazing method on Siler pincushion cactus habitat. The high intensity/short duration forage use of the Savory method would have a high impact on this taxon.

116. Special land designations.

Areas containing large, healthy, relatively undisturbed populations of Siler pincushion cactus on BLM administered land should be considered for designation as ACECs. This should be addressed in the HMP.

117. Develop memoranda of understanding or cooperative agreements between BLM, BIA, and the Fish and Wildlife Service on management of Siler pincushion cactus.

In order to facilitate the management and protection of this cactus, memoranda of understanding or cooperative management plans between the BLM, the BIA, and the Fish and

Wildlife Service should be developed. Such agreements should set forth long-term objectives and general management activities needed.

118. Monitor populations and habitat.

A comprehensive and ongoing monitoring program is a critical element in determining the present status of Siler pincushion cactus. Monitoring plots should be established in a representative cross-section of habitats with varying degrees of impact throughout the range of the plant. Establishment of monitoring plots which are read yearly is a necessary step for downlisting the species, and determination of long-term population and habitat stability is essential for delisting.

12. Protect populations on State and private lands.

Although populations on State or private lands lack the Federal legal protection afforded those on Federal lands, it is important for the well-being of the taxon that attempts be made to secure those populations, including enforcement of applicable State laws.

121. Enforce existing laws and regulations.

The provisions of State Native Plant Laws prohibiting collection of the species except under permit for scientific or educational purposes should be rigorously enforced. The commercial use and foreign regulation provisions of the Lacey Act, CITES, and ESA should be enforced to help protect the Siler cactus on State lands.

122. Develop memoranda of understanding or cooperative agreements with States and individuals for protection and management of Siler pin-cushion cactus populations on State and private lands.

Cooperative agreements between the Fish and Wildlife Service and the States of Arizona and Utah and private landowners can be very helpful in expediting the protection of plants on State or private lands, particularly in enforcing regulations cited in task 121.

123. Develop and implement habitat management plans (HMP) for cactus populations on State and private lands.

HMPs should be written similar to those developed by Federal agencies. These plans should provide for specific on-ground activities.

124. Monitor populations and habitat.

Monitoring is necessary to ensure maintenance of the existing populations and to avert threats to these populations. Long-term monitoring plots, read annually, should be established on State and private lands.

13. Develop a comprehensive trade management plan for all cacti.

In order to develop a plan for trade management, information is needed on what species are in the trade, the overall trend of trade in listed cacti, and the feasibility of reducing collecting pressure on wild populations by promoting a commercial, artificial propagation program. The plan should contain strategies for effective implementation of law enforcement responsibilities of ESA, CITES, Lacey Act, and State laws. The plan should be national in scope and address all cacti. It should contain official FWS policy on commercial, artificial propagation of endangered and threatened cacti.

131. Develop a trade study.

Documentation of what species are in the trade and where they are coming from is of primary concern to the development of trade management

strategies. This would involve the investigation of cactus dealers and catalogs, and interviews with knowledgeable individuals.

132. Develop a monitoring study to determine the impact of collecting.

Establish sample plots to monitor listed cacti and cacti suspected of being impacted by trade. Natural population changes as well as the success of recovery efforts would also be measured by the monitoring study. Studies of the impacts of seed collecting, and taking of cuttings are needed to understand harvest limits on the species.

133. Determine the feasibility of reducing collecting pressure on wild populations by promoting a commercial, artificial propagation program.

A commercial, artificial propagation program may remove some of the collecting pressure on cacti in the field. Some collectors enjoy raising their own plants from seeds or seedlings and if these are easily and economically available, then collectors may not turn to field collecting. Other collectors only want field collected plants, so some pressure is likely to continue on wild populations.

134. Establish FWS policy on the commercial artificial propagation of endangered and threatened cacti.

To implement cacti recovery plans, it is necessary that FWS determine official policy concerning commercial artificial propagation of endangered and threatened cacti.

135. Develop a Law Enforcement Strategy.

The plan should address issues involved in enforcing FWS regulations regarding all listed species. Special problems with listed cacti should be addressed.

2. Study populations in their natural habitat at existing sites.

Because of the rarity of Siler pincushion cactus, existing populations must be sustained in a healthy and vigorous state. An in-depth knowledge of the Siler pincushion cactus' ecology is needed to understand its habitat requirements. When these are known, they can be used to sustain healthy, natural populations.

21. Study the ecological requirements of Siler pincushion cactus.

Studies on specific geological/edaphic parameters need to be done to uncover factors influencing the

distribution of the cactus. Both required components and limiting factors should be determined.

211. Study the soil needs of Siler pincushion cactus.

The nature of the gypsiferous, often highly calcareous soil on which Siler pincushion cactus occurs needs to be studied. Edaphic factors involved in the restriction of Siler pincushion cactus to a specific soil type should be ascertained. Soil factors such as chemical composition, texture, structure, aeration, temperature, and relation to parent material, need to be assessed.

212. Study the water needs of Siler pincushion cactus.

The hydrologic characteristics of the soil on which Siler pincushion cactus occurs need to be determined. The timing and amount of rainfall at different seasons, with resulting moisture equivalence of the soil, needs to be studied.

213. Study the role of biotic factors in Siler pincushion cactus ecology.

Biotic factors influencing the survival of Siler pincushion cactus need to be studied. Such factors may be limiting to recovery and/or may be effectively manipulated to facilitate recovery.

2131. Herbivores.

Various herbivores, primarily rabbits and rodents, are abundant in the area. Evidence of their damage to plants, including mortality, has been noted. Insect damage to plants and fruits has also been observed.

2132. Pollinators.

Pollinators of Siler pincushion cactus are unknown. A detailed study is needed to identify the organisms that are pollinators for this cactus, and any special mechanisms involved.

2133. Other organisms.

Soil organisms such as fungi and nematodes may play an important role in the

ecology of the taxon, especially in relation to root rot. The relationship of frugivores to the cactus likewise needs to be assessed.

22. Study the population biology of the cactus.

The life history characteristics of Siler pincushion cactus should be studied because they reflect the taxon's adaptations to its particular environment. Some microhabitats allow higher fecundity and survivorship of individual plants than others, so characteristics of subpopulations can indicate which abiotic and biotic components are most essential to survival of the taxon. Population biology studies will also provide minimum and optimum numbers of plants for maintenance of viable populations.

221. Life history requirements.

The frequency of establishment of the seedlings, survivorship, fecundity, growth rates, density-dependence of pollination, and reproductive index of the taxon are some factors that need to be studied.

222. Monitor demographic trends.

Natural populations are often cyclical in their numbers of individuals. Often overlying this natural variation are the effects of man-caused environmental perturbations. Long-term monitoring studies are necessary to determine overall population trends and to determine whether the trends are natural or influenced by human impacts.

23. Apply the results of studies under tasks 21 and 22.

Knowledge of ecology and population biology will be necessary to define potential habitat and develop successful management plans.

231. Determine environmental parameters defining and restricting habitat, and identify all potential habitat.

Information is needed to explain why Siler pincushion cactus does not occur on all of the apparently suitable habitat in the area. Once these parameters are understood, all potential habitat for the species can be identified.

232. Revise a habitat management plan for each area in which the plant is found.

As more data is obtained on the ecology and population biology of Siler pincushion cactus, the HMP developed for each site should be revised to reflect new information obtained.

24. Inventory suitable habitat to make an accurate estimate of occupied habitat, and number of plants in the wild. Determine land ownership if not already known.

Inventories are needed to map the exact range of the cactus and to determine land ownership. These are necessary to determine management responsibilities and cooperative efforts. Similar geologic substrates should be checked again to be sure that populations have not been overlooked.

3. Develop public awareness, appreciation, and support for preservation of Siler pincushion cactus. Enlist the support of public interest groups in its survival.

Education of the public is a vital part of the recovery process. The cooperation of the public is essential for the ultimate success of the foregoing recovery measures. Public interest groups, especially local ones such as

native plant societies, cactus societies, and The Nature Conservancy chapters, need to be involved. The visibility of their support can be instrumental in shaping public opinion. Specific strategies would include lectures, pamphlets, letters, etc., concerning conservation of threatened and endangered species.

4. Develop propagation techniques to provide nursery stocks to reduce collection pressure.

The pressure of collection on natural populations could be reduced by developing the knowledge and techniques necessary to propagate plants for commercial trade. This task will be implemented if findings from task 133 indicate that it is an advisable means of reducing collection pressure on natural populations.

41. Investigate various methods of propagation.

Methods of propagation should be developed for mass production of nursery-grown plants to meet the demand of collectors for Siler pincushion cactus, and possibly reduce pressure of field collection.

42. Make propagation techniques known to nurserymen in order to provide plants for commercial trade.

Techniques developed for propagation of Siler pincushion cactus, and techniques already successfully

used by nurserymen should be compiled and published in appropriate journals or newsletters. This will enable commercial propagation of this cactus to occur, which may reduce the collecting pressure on wild stocks.

43. Enlist the aid of botanical gardens in carrying out tasks 3 and 4.

Botanical gardens should be enlisted to help in public education programs, development of propagation techniques, and dissemination of information to nurserymen and collectors.

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Plant Resources Institute. 1979. A feasibility study for the tissue culture of various species of Pediocactus. Final report prepared for BLM, Phoenix, AZ.

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_____. 1983. Endangered and threatened wildlife and plants: supplement to review of plant taxa for listing; proposed rule. Federal Register 48: 53640-53670.

PART III

IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows outlines actions and costs for the Siler pincushion cactus recovery program. It is a guide for meeting the objectives elaborated in Part II of this plan. This schedule indicates the general category for implementation, recovery plan tasks, corresponding outline numbers, task priorities, duration of tasks, ("ongoing" denotes a task that once begun should continue on an annual basis), which agencies are responsible to perform these tasks, and lastly, estimated costs for FWS tasks. These actions, when accomplished, should bring about the recovery of Siler pincushion cactus and protect its habitat. It should be noted that monetary needs for agencies other than FWS are not identified and therefore Part III does not reflect the total financial requirements for the recovery of this cactus.

General Categories for Implementation Schedule

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

Recovery Action Priorities

- 1 = an action that must be taken to prevent extinction or to prevent the species from declining irreversibly.
- 2 = an action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.
- 3 = all other actions necessary to provide for full recovery of the species.

Abbreviations Used

- FWS - USDI Fish and Wildlife Service
 SE - Office of Endangered Species
 LE - Law Enforcement
- BLM - USDI Bureau of Land Management
 BIA - USDI Bureau of Indian Affairs
 AZ - State of Arizona
 UT - State of Utah
 KP - Kaibab-Paiute Indian Reservation

IMPLEMENTATION SCHEDULE

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE AGENCY		FISCAL YEAR COSTS			COMMENTS
					FWS REGION	OTHER PROGRAM	FY 1	FY 2	FY 3	
M2	Enforce existing regulations	111 121	1	ongoing	2	SE LE	BLM BIA AZ UT KP	4,000	4,000	4,000
M3	Develop and implement habitat management plans	112 123	1	ongoing	2	SE	BLM BIA AZ UT KP	5,000		
M4	Prepare minimal feasibility report	113	2	1 year			BLM			
M3	Manage ORV use	114	2	ongoing			BLM			
M3	Manage live-stock grazing	115	2	ongoing			BLM			
M7	Consider designation of ACECs	116	3	1 year			BLM			
M7	Develop MOU or CA between BLM, BIA, States, or private individuals and FWS	117 122	3	1 year	2	SE	BLM BIA AZ UT KP	2,000		
R1	Monitor populations and habitat	118 124	2	ongoing	2	SE	BLM BIA AZ UT KP	10,000	10,000	10,000

*Costs refer to USFWS expenditures only.

IMPLEMENTATION SCHEDULE (continued)

GENERAL CATEGORY	PLAN TASK	TASK #	PRIORITY #	TASK DURATION	RESPONSIBLE AGENCY		FISCAL YEAR COSTS (EST.)*			COMMENTS
					FWS	OTHER	FY 1	FY 2	FY 3	
					REGION	PROGRAM				
R14	Develop a trade management plan	13	2	1 year	2	SE		20,000		
R3	Study ecological requirements	21	2	5 years	2	SE	BLM	10,000	10,000	10,000
R1, R16	Study population biology	22	2	5 years	2	SE	BLM	10,000	10,000	10,000
I14	Apply results of ecology and population biology studies	23	2	3 years	2	SE	BLM BIA AZ UT KP			5,000
I1	Inventory suitable habitat	24	2	3 years	2	SE	BLM BIA AZ UT KP	5,000	5,000	5,000
O1	Develop public awareness and support	3	3	ongoing	2	SE		5,000	1,000	1,000
M1	Develop propagation techniques	4	3	3 years	2	SE		15,000	10,000	10,000

*Costs refer to USFWS expenditures only.

APPENDIX

List of Reviewers

An agency draft of the Siler Pincushion Cactus Recovery Plan was sent to the following agencies for their review on August 22, 1985.

State Director, Bureau of Land Management, Phoenix,
Arizona

Area Director, Bureau of Indian Affairs, Phoenix, Arizona

Chairperson, Kaibab Band of Paiute Indians, Tribal Affairs
Building, Pipe Springs, Arizona

State Director, Bureau of Land Management

Associate Director of Natural Resources, Department of
Natural Resources, Salt Lake City, Utah

Director, Arizona Commission of Agriculture and Horticul-
ture, Phoenix, Arizona

Assistant Regional Director, Region 6, U.S. Fish and
Wildlife Service, Denver, Colorado

Non-Game Branch Supervisor, Arizona Game and Fish Depart-
ment, Phoenix, Arizona

Comments Received

Letters of comment on this plan have been reproduced in this section and are followed by the responses made to each comment.



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ARIZONA STATE OFFICE
3707 N. 7th Street
P.O. Box 16563
Phoenix, Arizona 85011

6840 (932)

January 8, 1986

RECEIVED
REFUGES

JAN 13 '86

Memorandum

To: Regional Director, Region 2, U.S. Fish and Wildlife Service
Albuquerque, New Mexico

From: State Director, Arizona

Subject: Agency Review of Pediocactus sileri Draft Recovery Plan

Enclosed are the Bureau of Land Mangement's comments on the draft recovery plan for Pediocactus sileri.

If you have any comments, please contact John Schuler or Carole (Kniffy) Hamilton at this office (932), FTS 241-5509.

End. Sp. R-2
JOHNSON
LANGOWSKI
Bowman
Burton
Carley
Halvorson
Hoffman
Lewis
McDonald
Clwell
Steffrud
Stout
PADILLA
Harp
Hopp
SANCHEZ
FILE

Enclosure

FWS REG 2
RECEIVED

JAN 27 '85

SE



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
UTAH STATE OFFICE
324 SOUTH STATE, SUITE 301
SALT LAKE CITY, UTAH 84111-2303

IN REPLY REFER TO

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(U-932)

RD _____
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AWP _____
AHR _____
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OCT 9 1985

Memorandum

To: Assistant Regional Director (AFF), U.S. Fish and Wildlife Service, Albuquerque, New Mexico

From: State Director, Utah

Subject: Review of Pediocactus sileri Draft Recovery Plan

We have reviewed the draft recovery plan and have the following comments:

Part I, Introduction, Paragraph 3:

It is questionable that potential mining activities, off-road vehicle use, and grazing are impacting the habitat. See briefing paper on delisting Pediocactus sileri, 8/7/85, written by Arizona Strip District, BLM (copy enclosed).

B-1

Part II Objectives:

Objectives and planned actions are a little vague. Monitoring studies should be described in detail. Reference is made to the development of an HMP; however, the recovery plan should be able to stand by itself.

B-2

Objective #2.

A Mineral Feasibility Report (BLM) has been completed.

B-3

Part II, Step-Down Outline:

The plan should contain an implementation schedule and a description of the various agencies' responsibilities in terms of work months and dollars in the recovery effort.

B-4

Thank you for the opportunity to comment on the draft recovery plan.

[Handwritten Signature]
ACTING

1 Enclosure

Encl. 1 - Briefing Paper (3 pp.)

End. Sp. R-2	
JOHNSON	
LAWRENCE	
Bowman	
Burton	
Carley	
Holmes	
Hoffman	
Lewis	
McDonald	
Smith	
Stout	
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BSF & W-REG. 2
OCT 15 1985
OFFICE OF THE
REGIONAL DIRECTOR

FWS REG 2
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OCT 16 '85
SE

BRUCE BABBITT, Governor

Commissioners:
CURTIS A. JENNINGS, Scottsdale, Chairman
W. LINN MONTGOMERY, Flagstaff
FRED S. BAKER, Elgin
LARRY D. ADAMS, Bullhead City
FRANCES W. WERNER, Tucson

Director
BUD BRISTOW

Assistant Director, Services
ROGER J. GRUENEWALD

Assistant Director, Operations
DUANE L. SHROUFE



ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

September 18, 1985

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AWR	
AHR	
LE	
PAO	
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2. FILE	<input checked="" type="checkbox"/>
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Conrad J. Fjetland
U.S. Fish and Wildlife Service
Post Office Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Fjetland:

In correspondence dated 22 August 1985, you requested agency comment on the draft recovery plan for Pediocactus sileri. The Commission and Department have determined that it would be inappropriate to comment on rare plant issues except to evaluate accuracy of distributional information and protection-status classification. That is, we will point out errors on localities of occurrence and of the status given for a species (i.e. Federally-listed, Notice of Review--Category 2, Federally-proposed, BLM-sensitive, USFS-sensitive, etc.) but we will not comment on whether or not that status is appropriate (i.e. no recommendations to reclassify) or whether or not any specific biological or other factor is a threat to the species. The reasoning behind this stance is that it would be inappropriate for us to advocate protection of rare plants when at some point that might result in conflict with our basic mission, to protect wildlife.

C-1

End Sp. R.	
GINSON	<input checked="" type="checkbox"/>
Bowman	
Burton	
Carlov	
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Hallman	
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FILE Recovery	

With the above considerations in mind, we should explain the role of our Nongame Branch in regard to rare plants. It functions solely as a central repository and disseminator of information on rare plants. The information previously collected by the Arizona Natural Heritage Program and now being collected by the Nongame Branch will continue to be made available to State and Federal agencies and private parties (e.g. environmental consultants, etc.). Although our program will not be developing new locational information through fieldwork, agencies have indicated that just this central clearinghouse role would be a substantial asset in the environmental review process. This role makes it especially important that we continue to receive the excellent information that your staff, notably Rusty Kologiski and now Peggy Olwell, have consistently provided. Access to particularly sensitive locational information, such as for Pediocactus sileri, will of course be on a "need to know" basis, with consideration of potential collecting activity foremost in mind.

FWS REG 2
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REC'D
FWS-Region 2

SEP 25 '85

SEP 25 1985

Conrad J. Fjetland

-2-

September 18, 1985

To further develop this aspect of our nongame program, we are now recruiting a Nongame Habitat Specialist, who will focus on data base management, threatened plant communities and habitat problems as they relate to nongame wildlife. The ideal candidate would have a strong botanical background, to assist in quality control of the information we manage, including rare plant data.

I trust this will clarify our program and will facilitate the Service's coordination with us. If you have any further questions, please contact me or Terry B. Johnson, Nongame Branch Supervisor.

Sincerely,



Bud Bristow
Director

BB:TBJ:rp

cc: Terry B. Johnson



United States Department of the Interior
FISH AND WILDLIFE SERVICE

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225

STREET LOCATION:
134 Union Blvd.
Lakewood, Colorado 80228

IN REPLY REFER TO:

FA/SE/Pediocactus sileri
Recovery Plan - Agency Draft
SE 60153

File No.	Sp. R-2
JOHNSON	
LARGOWSKI	
Bowman	
Burton	
Carley	
Halverson	
Hoffman	
Lewis	
McDonald	
Olwell	EO
Stefferd	
Stout	
PADILLA	
Harp	
Hopp	
SANCHEZ	
FILE	

DEC 12 1985

MEMORANDUM

To: Regional Director, FWS, Region 2 (SE)
From: ^{ACTING} Assistant Regional Director, Federal Assistance, Region 6
Subject: Agency Review Draft of the Recovery Plan for Pediocactus sileri

Attached are the comments prepared by our Salt Lake City Endangered Species Field Office on the subject recovery plan. If you have any questions on these comments, please contact Larry England at FTS 588-4430.

Attachment

General Comments - Pediocactus sileri - Recovery Plan

Task 24, Inventory suitable habitat..., should be a primary task of the recovery plan. Based on the overall range, the amount of potential habitat, and the numbers counted previously by Ralph Gierisch, the possibility exists of finding sufficiently large numbers of Pediocactus sileri already in existence to meet the delisting criteria. It is recognized that Pediocactus sileri is not uniformly distributed throughout its range or habitat (for example, although it occurs on the band of Moenkopi formation along the northern base of Lost Spring Mountain; it apparently does not occur on a seemingly identical band of Moenkopi formation along the southern base of Little Creek Mountain only a mile to the north of Lost Spring Mountain). Such an inventory with special land use designations at the \$15,000 amount listed in the Implementation Schedule may be the most cost effective way to manage Pediocactus sileri compared to studies (21, 22, and 23-\$65,000) and propagation (4-\$35,000). Land use designations such as ACEC's, no surface occupancy, and mineral withdrawals can be pursued with BLM at minimal cost. A nationwide study of the cactus trade problem should be funded by the W.O. rather than separate funds for each cactus species (13-\$20,000).

Recommended text changes of Agency Review Draft Recovery Plan for Pediocactus sileri follow:

D-1

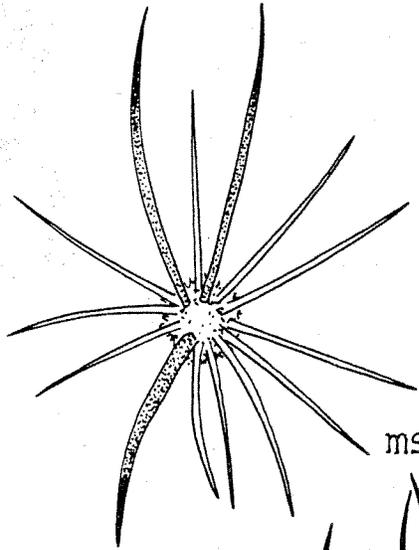
D-2

Responses to Comments

- A-1 The BLM comments were not reproduced in this section because of the sensitive nature of the locality information included in the comments. The Service addressed the BLM comments on the recovery plan and, when appropriate, made the suggested changes, incorporated the recommendations, or corrected the information. Those BLM recommendations that the Service had questions about were discussed individually in a response letter to BLM from the Service.
- B-1 The Service believes that the establishment and monitoring of permanent relocatable plots will provide the necessary documentation to determine whether various land use practices are impacting Pediocactus sileri and its habitat. Until that data is available, these land use practices are viewed as potential threats.
- B-2 The actions identified for downlisting and delisting were developed during a meeting between BLM, Museum of Northern Arizona and the Service personnel in July 1984. They provide a reasonable approach to the recovery of the species. The recovery plan outlines those tasks which are necessary for the recovery of the species; the development and implementation of an HMP is an integral part of the recovery process for Siler pincushion cactus.
- B-3 The Service is aware that a Mineral Feasibility Report has been completed by BLM; however, all actions will remain in the recovery plan as criteria necessary for downlisting and delisting.
- B-4 Because the recovery plan is only approved by the Service, we can address the estimated costs for Service expenditures only. It is the responsibility of the land managing agencies to determine the work months and dollars for recovery efforts for species on their land.
- C-1 The protection of rare plant species provides habitat protection and enhancement for all wildlife, and is not viewed as being in conflict with the protection of wildlife. The Service is disappointed that the Arizona Game and Fish Department will not be commenting on rare plant issues except to evaluate the accuracy of distributional and status data; however, we do appreciate

your consideration of these aspects of rare plant conservation. The Service will continue to provide Arizona Game and Fish Department with information on threatened and endangered plants of Arizona.

- D-1 The Service considers the inventory of suitable habitat of primary importance to the recovery of the species; however, numbers alone will not justify downlisting or delisting. The long-term stability of the species, habitat protection, and absence of threats need to be demonstrated as well.
- D-2 Text changes are addressed in the plan when appropriate.



1 cm

ms

