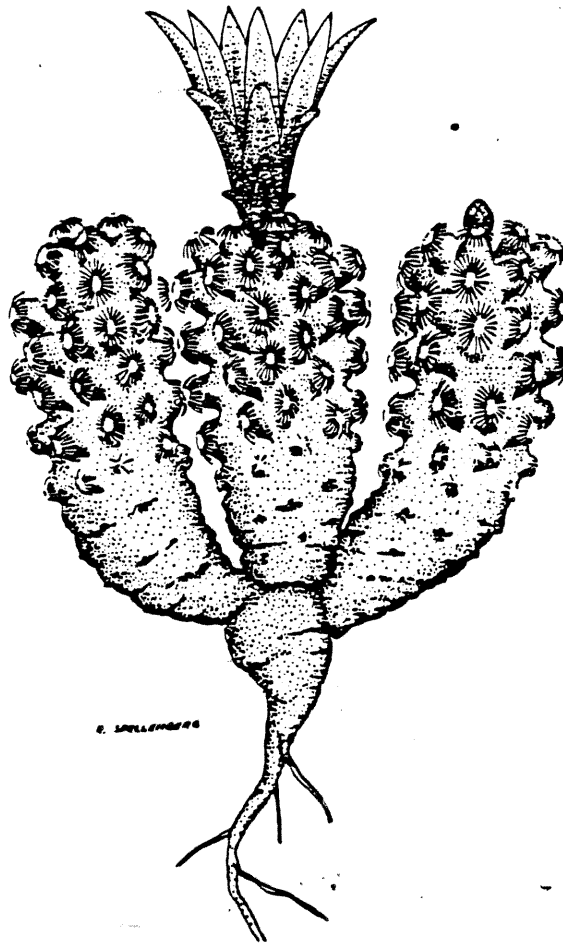


KNOWLTON CACTUS

(Pediocactus knowltonii)

RECOVERY PLAN



U.S. FISH & WILDLIFE SERVICE
ALBUQUERQUE, NEW MEXICO

1985

RECOVERY PLAN FOR THE KNOWLTON CACTUS

Pediocactus knowltonii L. BENSON

Prepared by:

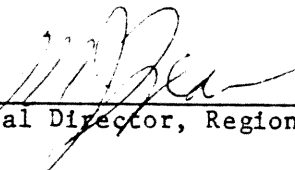
Kenneth D. Heil
Math-Science Department
San Juan Community College
Farmington, New Mexico

for

U.S. Fish and Wildlife Service, Region 2

Reviewed and Edited by:

Peggy Olwell

Approved 
Regional Director, Region 2

Date 3/29/85

DISCLAIMER

This is the completed Knowlton 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 it does not necessarily represent the views of all individuals who played a key role in preparing this plan. This plan is subject to modification as dictated by new findings and 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 budgetary constraints.

Literature citation should read as follows:

U.S. Fish and Wildlife Service. 1985. Knowlton Cactus Recovery Plan.
U.S. Fish and Wildlife Service, Albuquerque, New Mexico. iv + 53 pp.

Additional copies may be purchased from:

U.S. Fish and Wildlife Reference Service
6011 Executive Blvd.
Rockville, Maryland 20852
Telephone: (301) 770-3000
Toll Free - 1-800-582-3421

ACKNOWLEDGEMENTS

Information and assistance in preparation of this plan were provided by Prince Pierce (botanist, Albuquerque, New Mexico), Mark Porter (San Juan Community College), John Egbert (New Mexico Office of The Nature Conservancy), Dick Dewey (Western Regional Office of The Nature Conservancy), and the New Mexico Plant Recovery Team members; Dr. Richard Spellenberg, Paul Knight, Reggie Fletcher, Gerard Hoddenbach and Lee Upham.

In addition, we would like to acknowledge the technical assistance and comments of William F. Isaacs (New Mexico Natural Resources Dept.), David Sabo (Public Service Company of New Mexico), Joseph Dowhan (Office of Scientific Authority, USFWS), John Anderson (Region 6, USFWS) and the botanists of the Washington Office of Endangered Species.

SUMMARY

- GOAL: To remove Pediocactus knowltonii from the Federal list of endangered and threatened species by managing and protecting the populations from present and future human threats and ensuring the maintenance of vigorous self-sustaining populations in the species' natural habitat.
- RECOVERY CRITERIA: Because there is inadequate biological data for P. knowltonii and because there is only one viable population, downlisting and delisting criteria cannot be established at this time.
- RECOVERY ACTIONS: Major steps needed to ensure the survival of P. knowltonii and to aid in its recovery are: secure cooperation of The Nature Conservancy; reintroduce the cactus into sites within its historic range; monitor the species to obtain population data that can be used to suggest other recovery strategies and management techniques.

TABLE OF CONTENTS

	<u>Page</u>
DISCLAIMER	i
ACKNOWLEDGEMENTS.....	ii
SUMMARY.....	iii
Part I INTRODUCTION.....	1
Brief Overview.....	1
Taxonomy	2
Morphology	2
Distribution	3
Land Ownership	3
Habitat	5
Population Biology.....	5
Demographic Trends.....	5
Phenology	7
Associated Species	8
Pollination Vectors	9
Impacts and Threats	9
Collecting.....	9
Oil and Gas Exploration.....	11
Road Building and Maintenance.....	13
Livestock Trampling.....	13
Recreational Development.....	13
Natural Threats.....	14
Conservation Efforts.....	15
Part II RECOVERY.....	16
Objective	16
Step-down Outline	17
Narrative	20
Literature Cited	32
Part III IMPLEMENTATION SCHEDULE	33
APPENDIX.....	37
List of Reviewers.....	37
Comments Received.....	38
Responses to Comments.....	50

PART I

INTRODUCTION

Brief Overview

The Knowlton cactus, Pediocactus knowltonii L. Benson, was listed as endangered on October 29, 1979 (44 FR 62244). Three other members of this genus are listed as endangered: Pediocactus bradyi L. Benson; P. peeblesianus var. peeblesianus (Croizat) L. Benson; and P. sileri (Engelm.) L. Benson. In addition, the 1980 notice of review and its 1983 supplement (45 FR 82480, 48 FR 53640) list five candidate species from this genus: P. despainii Welsh and Goodrich; P. papyracanthus (Engelm.) L. Benson; P. paradinei B. W. Benson; P. peeblesianus (Croizat) L. Benson var. fickeiseniae L. Benson; and P. winkleri Heil.

Members of the genus Pediocactus occur in pinyon-juniper woodlands, sagebrush flats, desert grasslands, and the Navajoan Desert. Pediocactus knowltonii is the smallest member of the genus and occurs in only two small populations, of which only one is viable. It inhabits pinyon-juniper woodland in a very limited area of northwestern New Mexico.

Presently known populations are threatened by illegal commercial and private collection, energy exploration and development, and various other human activities. The purpose of this recovery plan is to establish objectives and a general plan of action that will result in the stabilization

of existing populations and the increase in numbers of individuals and populations. Survival of the species and ultimately the removal of the species from endangered status is the intention of the recovery plan.

Taxonomy

The Knowlton cactus was first discovered in 1958 by the late Fred G. Knowlton of Bayfield, Colorado. A specimen of this cactus was sent to Lyman Benson, but there was uncertainty about the maturity of the plants. Benson first described it briefly in 1960, and in 1961 completed the publication (Benson 1961). The spines of the Knowlton cactus differed from juvenile plants of P. simpsonii, but publication of the new species was considered unwise until more evidence of maturity of the Knowlton cactus could be obtained. In August 1960, Mr. Prince Pierce of Albuquerque, New Mexico, collected specimens of the Knowlton cactus of which the largest were the same size as those collected by Mr. Knowlton. The type specimen (No. 288,314) was deposited at the herbarium of Pomona College. Backeberg (1976) believes P. knowltonii to be P. bradyi var. knowltonii.

Morphology

The Knowlton cactus is a very small plant, solitary or clustered, globular, ranging in size from 0.7-5.5 cm tall and 1-3 cm in diameter,

light gray-green; central spines none; radial spines minute, 18 to 24 from areole at tip of tubercle, white, pectinate-spreading, 2 mm long (Earle 1980) [See cover illustration]. Pediocactus knowltonii, P. bradyi, P. winkleri, and P. despainii usually have no central spines. Table 1 provides a comparison of key characteristics of the four species.

Distribution

The Knowlton cactus occurs in the pinyon-juniper woodland of northwestern New Mexico in San Juan County. Extension of the population into La Plata County, Colorado, has been reported but is questionable. The type locality for the Knowlton cactus is south of La Boca, Colorado, in San Juan County, New Mexico. This locality contains the only viable population of P. knowltonii and presently is estimated to contain 7,000 plants. A second population, consisting of two plants, is located in Reese Canyon in San Juan County, New Mexico. It is unknown whether this population is natural or is the result of transplantation by the New Mexico Cactus and Succulent Society in 1960 (P. Knight, New Mexico Natural Resources Department [NMNRD], pers. comm. 1984, M. Porter, San Juan College [SJCC], pers. comm. 1985).

Land Ownership

In an effort to protect the La Boca population of Pediocactus knowltonii, the Public Service Company of New Mexico (PNM) donated 25 acres of land surrounding the center of the population to The Nature Conservancy (TNC). The Reese Canyon population is on Bureau of Land Management (BLM) lands.

Table I. Comparison of Morphologic Features of Four Species of Pediocactus

Stem Number	Stem Size	Areoles	Radial Spines	Petaloid Perianth Parts	Seed	Habitat and Locality
<u>Pediocactus knowltonii</u> Solitary or clusters up to 19	Length 0.5 to 2.5 cm; diameter 1.3.-2.5 cm	Woolly in youth but becoming naked in age	Number 18-26; length 1-1.5 mm	Pink	Black; papillae with no mounds or ridges; surface with sheen; length up to 3 mm; diameter up to 2 mm	Pinyon-Juniper Woodland; Tertiary alluvial deposits on San Jose Formation; New Mexico
<u>Pediocactus bradyi</u> 1 to rarely 4	Length 3.8 to 6.4 cm; diameter 2.5-5 cm	Villous	Number 14-15; length 3-6 mm	Pale straw yellow	Brown; papillae form little mounds with no ridges; surface dull; length up to 2.75 mm; diameter 1.75-2 mm	Navajoan Desert; Kaibab Limestone; Arizona
<u>Pediocactus winkleri</u> 1 to rarely 4	Length 3.9 to 6.8 cm; diameter 2-2.6 cm	Mostly woolly but naked in some plants	Number 8-14; length 1.5-4 mm	Peach to pink	Black; papillae mounds coalesce into ridges; surface with sheen; length up to 3 mm; diameter 2-2.5 mm	Navajoan Desert; Dakota Formation; Utah
<u>Pediocactus despainii</u> 1 to rarely 4	Length 3.8 to 6 cm; diameter 2-2.6 cm	Naked	Number 9-13; length 2-6 mm	Yellow bronze to peach bronze	Black; papillae mounds coalesce into ridges; surface with sheen; length up to 3.5 mm; diameter 2.5 mm	Pinyon-Juniper Woodland; Carmel Formation; Kaibab Limestone Formation; Utah

Habitat

Pediocactus knowltonii grows in areas of the Colorado Plateau Province in the Navajo Section (Foster 1979). The bulk of the species in the genera of Pediocactus and Sclerocactus are found only on the Colorado Plateau. Knowlton cactus is at the very eastern edge of the Colorado Plateau Province, adjacent to the San Juan Mountains (Benson 1982).

Pediocactus knowltonii grows on Tertiary alluvial deposits overlying the San Jose Formation. These deposits form rolling, gravelly hills covered with pinyon pine (Pinus edulis), Rocky Mountain juniper (Juniperus scopulorum), and sagebrush (Artemisia tridentata). The surficial rocks range from pea to cobble-sized. The La Boca population grows on the slopes and top of a single hill at 2,075-2,095 meters. The Reese Canyon population is at 2,300 meters. The annual precipitation of this region is approximately 30 centimeters (12 inches), mostly during summer and winter months.

Population Biology

Demographic trends

Most of the information in this section is a result of field research conducted by the author. The total population of Pediocactus knowltonii presently numbers approximately 7,000 plants. In 1960, the La Boca

population was estimated at over 100,000 plants (P. Pierce, botanist, pers. comm. 1982). Since that time, the population numbers dropped from approximately 4,000-5,000 individuals in 1975 to probably less than 1,000 plants in 1979. In the late 1970's some collectors felt that the natural population of the Knowlton cactus had been eliminated. Since 1980, however, the collecting pressure is thought to have lessened. Seeds in the soil (the seed bank) have germinated, and the population has increased to approximately 7,000 plants.

The area of the La Boca population is estimated to be 5 hectares with the highest densities within less than 1 hectare (P. Knight, NMNRD, pers. comm. 1985). The number of individuals of P. knowltonii per unit area varies tremendously. As many as 20-30 individuals may occur in a square meter, while an adjacent area of 10 square meters may contain only one to three plants. This clumped distribution may be a result of seed dispersal characteristics (Knight 1981), or subtle features of the microhabitat that influence seedling establishment (see section on Phenology). There is no evidence of reproduction at the Reese Canyon site (M. Porter, SJCC, pers. comm. 1984). However, many seedlings were observed at the La Boca population. Most P. knowltonii bloom at 3-4 years of age. Due to collection, however, there are few plants that reach this age found at the La Boca site.

Phenology

Information in this section was obtained via personal communication with Steve Brack, a cactus nurseryman, Belen, New Mexico.

Knowlton's cactus buds in early to mid-April and flowers from mid-April to early May, the flowers open by mid-morning and close in late afternoon, and generally last 2-3 days.

Fruit forms in late May to early June. In mid-June 1981, a seed-set study was undertaken; of 100 mature flowering individuals, only 22 contained developing fruit. This rate may vary from year to year and additional studies are needed to arrive at a reliable indication of fecundity (P. Knight 1981).

The fruit dehisces from mid-to-late June by a vertical slit along one side of the ovary wall. The seeds fall to the base of the parent plant. Running water appears to be the major factor in carrying the seeds away from the parent plants. The seeds are carried downslope and are trapped among the cobbles and pebbles, or by the duff under a sagebrush, pinyon, or juniper plant. This may account for the patchily distributed seedlings. The amount of time required for seed germination in the natural habitat is unknown. The Reese Canyon population may be the result of bird transport (instead of the result of transplantation efforts) and subsequent germination

of the seeds in place. However, due to the species' limited distribution, it is doubtful that birds and/or rodents play a major role in the dispersal of Knowlton cactus seeds.

On the average, each P. knowltonii fruit produced 10-12 seeds, and most P. knowltonii produce only 2-3 fruits. A population of 50 healthy plants with 22 percent producing mature fruit would, therefore, produce up to approximately 400 seeds. The germination rate under field conditions is unknown and therefore the reproductive and recovery potential of the population cannot be determined at present. However, if collection escalates again, fewer cacti will reach maturity and there will be fewer seeds produced for the seed bank. As a result, Knowlton's cactus could easily become extinct in its natural habitat.

Associated Species

The Knowlton cactus occurs on alluvial hills of red-brown clay soils. Dominant plant species are: Rocky Mountain juniper (Juniperus scopulorum), pinyon pine (Pinus edulis), sagebrush (Artemisia tridentata var. nova), wooly phlox (Phlox hoodii), and beard-tongue (Penstemon linarioides var. coloradoensis) (M. Porter, SJCC, pers. comm. 1984).

Parmelia physodes var. vittata, a foliose lichen, occurs throughout the Knowlton cactus habitat in great abundance. Its presence may be important to seed establishment. However, the relationship between the lichen and the Knowlton cactus has yet to be determined.

Pollination Vectors

The major pollinator of Pediocactus knowltonii has not been determined. However, due to the color, shape, and opening time of the flower, it is most likely pollinated by insect vectors. Ants have been seen crawling in and out of the Knowlton cactus flower and may act to some degree as a pollinator (P. Knight 1981). Also, a native bee has been observed inside the flower (D. Dewey, TNC, pers. comm. 1984).

Impacts and Threats

The present and historic ranges of the Knowlton cactus are believed to be the same except for the location found near Reese Canyon. The La Boca population has been significantly reduced by collection. The following are existing or potential threats to the Knowlton cactus.

Collecting

A major impact and threat to Pediocactus knowltonii is, and has been, collection. In April 1960, members of the New Mexico Cactus

and Succulent Society set out to "rescue" P. knowltonii from flooding due to the construction of Navajo Dam. The society members collected all the plants they could from the La Boca population. Some may have been transplanted to the Reese Canyon locality.

The habitat of the Knowlton cactus was never affected by the flood waters of Navajo Lake. According to Prince Pierce, an Albuquerque botanist who was at the Knowlton cactus site during the 1960 collecting trip, the Knowlton cactus population at that time was estimated to be over 100,000 (P. Pierce, botanist, pers. comm. 1982).

In 1975 the population numbered nearly 5,000 plants but by the mid-1970's the numbers dropped to probably less than 1,000 plants. At that time many collectors felt the Knowlton cactus was extinct in its natural habitat. At present the population numbers approximately 7,000 individuals with virtually no old plants. Old individuals are presently absent from all extant populations and only about 22 percent of all known individuals are currently producing seed (P. Knight 1981). This suggests that collectors are continuing to selectively remove older plants.

The Knowlton cactus is not difficult to grow in cultivation. Though the flowers are small and not showy, most collectors prize the

cactus for its rarity. The size of the Knowlton cactus works against its survival. Because the cactus is small, and therefore easy to transport and conceal, collectors tend to take large numbers of the plants. Many private and commercial collectors know the exact location of the Knowlton cactus habitat.

Because large numbers of Pediocactus knowltonii have been collected since its discovery in 1958, the number of seeds remaining in the soil seed bank may already be exhausted. If collecting continues to remove reproducing adults, as is suspected, then annual recruitment and establishment of seedlings may fail or significantly decrease. This would result in a rapidly and steadily diminishing population. The only viable population in the world is so situated and the location so well known that one person could easily collect every adult cactus in a few hours. Unless other sites containing Knowlton cactus are discovered, which is highly doubtful given the number and area of accomplished field surveys, this species may be on the brink of extinction in its natural habitat (D. Dewey, TNC, pers. comm. 1984).

Oil and Gas Exploration

In 1981, Paul Knight of the New Mexico Natural Heritage Program, discovered a small population (eight plants) of P. knowltonii on BLM land just west of Reese Canyon. The plants did not appear healthy and only one had produced fruit and seed. This population

may be a result of transport of a single fruit, or the result of the transplanting effort previously mentioned, for the entire population is not more than 3 meters across (P. Knight 1981). In the spring of 1982, six of the eight plants were destroyed by erosion due to an increase in the use of an adjacent road for gas and oil exploration. An investigation of the site by FWS and BLM indicated that Section 7 of the ESA was not intentionally violated. BLM is planning to fence the population in the near future and will consider the species if there is any further oil and gas exploration (J. Ramaka, BLM, pers. comm. 1984).

There are no gas wells directly on the La Boca site, although there is a gas well at the eastern edge of the hill where the plants occur. Because this site is in an area of proven oil and gas deposits, the potential for oil and gas exploration, development, and production in and around the cactus population exists. The Nature Conservancy was given title to the surface rights of the land by PNM in the summer of 1983. The Nature Conservancy hopes to obtain cooperation from the six energy firms holding mineral rights beneath the land (J. Egbert, TNC, pers. comm. 1984).

Road Building and Maintenance

At the La Boca site there is a dirt road running north-south at the foot of the hill on the west side of the population. It may have been during construction of this road that the original discovery of P. knowltonii occurred. Fred Knowlton collected the type specimen of this cactus in 1958 in the wake of a bulldozer where, "...little white spined balls were coming up all over the place..." (Benson 1961). No widening or new construction of roads are planned for the La Boca site. The two remaining plants of the Reese Canyon population could be destroyed by road widening or maintenance, as were six of the eight cacti found in that population in 1981.

Livestock Trampling

Presently, livestock trampling does not appear to be a major problem to Pediocactus knowltonii. At the La Boca site there has been some grazing of livestock; however, since TNC acquired the land, the area has been fenced and there is no livestock use. The hill directly north of the La Boca site has been affected heavily by trampling of cattle and in the past may have been a site of the Knowlton cactus. The population near Reese Canyon has not been affected by livestock use.

Recreational Development

The Los Pinos River Valley, which includes the Knowlton cactus habitat, is an excellent area for recreation and development of vacation land.

Although there is no possibility of the TNC land being sold to developers, development of the surrounding area, and the subsequent influx of people into the area, may have a strong negative effect on the Knowlton cactus (e.g., additional collection and ORV traffic).

Natural Threats

A few Pediocactus knowltonii have been found with their root systems exposed, apparently pushed completely out of the ground by frost heave. Some plants are only partially exposed. Plants that develop offsets appear not to be affected by frost heave. During some years late fall moisture and temperature may be such that freezing also takes a heavy toll (R. Fletcher, U.S. Forest Service, pers. comm. 1982).

Knowlton cacti growing on the sides of hills are subject to erosion. Fortunately, erosion is most prominent on the eastern side of the hill where few Knowlton cacti grow. Their absence there may be the result of erosion.

More studies are needed to determine the role of the Knowlton cactus in the environment. This cactus can grow in full sunlight or in shade under a sagebrush, pinyon, or juniper plant. It does not appear to be able to compete for space with other plants and is often found where other plants do not grow.

Most of the known *Pediocacti* have a very limited distribution partly due to seed dispersal methods and/or seedling establishment requirements. Many members of this genus are also limited to specific geologic formations. With the only known viable population of *Pediocactus knowltonii* restricted to one hill, a single catastrophe could eliminate all or nearly all of the plants in their natural habitat.

Conservation Efforts

Much has been done to protect the Knowlton cactus from extinction. The Nature Conservancy and PNM have been instrumental in providing protection to the species through land exchanges and fencing. The BLM is continuing its 2-year survey for *P. knowltonii* on BLM lands in the vicinity of the type locality. Major tasks, however, remain before the Knowlton's cactus can be considered secure. Alleviation of collection of the cactus is of primary importance.

PART II

RECOVERY

Objective

The main objective of this recovery plan is to remove Pediocactus knowltonii from the list of endangered and threatened species. This can be accomplished by protecting the populations from present and future human threats and ensuring the maintenance of vigorous self-sustaining populations in the species' natural habitat. A self-sustaining population should be achieved by the restoration of the primary population to a level near the estimated carrying capacity of 100,000 individuals.

Protection of the Knowlton cactus habitat from manmade impacts is necessary to achieve its recovery. This should involve securing the cooperation of TNC, managing oil and gas exploration and removing the collection threat. The reintroduction of the cactus into new areas within its historic range will further aid in the recovery of P. knowltonii. More research and monitoring are required to provide a greater knowledge of the population biology of this species and, in turn, these data can be used to suggest other recovery strategies and management techniques to enhance the habitat.

Because there is little biological data on the species and because there is only one viable population, downlisting and delisting criteria cannot be established at this time. More research is necessary for the quantification of downlisting criteria.

Step-down Outline

1. Remove threats to Pediocactus knowltonii by enforcement of existing regulations, analysis of threats, and management for optimal protection.
 11. Enforce existing regulations.
 111. Work with BLM to ensure their responsibilities are carried out.
 112. Enforce existing collecting and trade regulations under the Endangered Species Act (ESA), the Convention on International Trade in Endangered Species (CITES), Lacey Act, and State laws.
 12. Work with The Nature Conservancy (TNC) to protect the primary population from further collection and disturbance.
 121. Maintain a fence around the La Boca population.
 122. Secure cooperation between FWS and TNC.
 123. Contact adjacent landowners.
 124. Monitor population and habitat.
 125. Establish communication and secure cooperation of mineral rights holders.

13. Develop management strategies for known and new populations.
 131. Consider rerouting or closing the road near the La Boca population.
 132. Manage oil and gas exploration.
 1321. Survey for Pediocactus knowltonii in the Los Pinos River Valley and Reese Canyon area.
 1322. Use slant drilling for oil and gas if necessary.
 133. Exercise careful planning of new roads or any other development concerning P. knowltonii habitat.
2. Maintain viable populations in their natural habitat.
 21. Determine ecological requirements of Knowlton cactus.
 211. Determine all mechanisms involved in seed dispersal.
 212. Determine the number of years involved in seed germination and the dormancy requirements.
 213. Determine what microhabitat factors are involved in seedling germination and establishment.
 214. Determine the rate of seed germination and the overall reproductive success of the taxon.
 215. Determine what insects are involved in the pollination of Pediocactus knowltonii.
 216. Determine if there is a relationship between Parmelia physodes var. vittata and Pediocactus knowltonii.
 217. Determine the edaphic requirements of the Knowlton cactus.

22. Search for new populations.
 23. Reintroduce P. knowltonii onto protected public land within the historic range of the species.
3. Develop a comprehensive cactus trade management plan.
 31. Develop a trade study.
 32. Determine the impact of collecting.
 33. Determine feasibility of reducing the collecting pressure on the wild populations by promoting a commercial, artificial propagation program.
 34. Develop law enforcement strategy.
 4. Develop public awareness, appreciation, and support for the preservation of the Knowlton cactus.
 41. Increase the public's knowledge of Knowlton cactus.
 42. Enlist the support of public interest groups.

Narrative

1. Remove threats to Pediocactus knowltonii by enforcement of existing regulations, analysis of threats, and management for optimal protection.

Because of the rarity of the Knowlton cactus, all existing populations must be protected by the enforcement of existing regulations and removal of threats to the species.

11. Enforce existing regulations.

Cooperate with BLM to enforce existing regulations. Because the major threat to P. knowltonii is collection, enforcement of regulations is a priority one task necessary to prevent the irreversible decline of the species.

111. Work with BLM to ensure their responsibilities are carried out.

All existing regulations and responsibilities must be enforced and monitored by the BLM on BLM lands occupied by the species.

112. Enforce existing collecting and trade regulations under the ESA, CITES, Lacey Act, and State laws.

Individuals illegally collecting and/or transporting the Knowlton cactus across state or international borders for commercial purposes should be apprehended as a

deterrent to other collectors and the judgement should be published in the Cactus and Succulent Journal of America.

12. Work with The Nature Conservancy (TNC) to protect the primary population from further collecting and disturbance.

Because the only viable population is on TNC land, it must be protected and carefully managed. Therefore, the actions elaborated below are necessary for the recovery of the species.

121. Maintain a fence around the La Boca population.

A strong barbed wire fence has been erected by TNC to keep out domestic livestock that could trample the Knowlton cactus. If domestic livestock were allowed to graze on the Knowlton cactus site, the trampling action of the animals would have a large impact on this cactus population. The hill directly north of the Knowlton cactus site is used by livestock and all vegetation there has been strongly affected. This fence might act as a deterrent to some collectors. In addition, "No Trespassing" and "No Hunting" signs are displayed on the fence around the periphery of the habitat.

122. Secure cooperation between FWS and TNC.

The ESA is only effective in protecting species on Federal land. Protection of habitat will require Federal involvement if ESA coverage is to be obtained.

Therefore, actions enhancing cooperation are necessary so that FWS law enforcement capabilities can be implemented on land owned by TNC. Without proper management and protection, eventual extinction of the species will result and because of the urgency this task has received a priority one rating.

123. Contact adjacent landowners.

The landowners should be provided with verbal information, as well as literature on the species, to instruct them on the identity of the plants and also to make them aware of the importance of the species. Creating an interest in the Knowlton cactus among the landowners may result in the identification of currently unknown populations or the identification of sites for reintroduction, and may also result in landowners reporting illegal collection of the species to authorities.

124. Monitor population and habitat.

Plots should be set up at the La Boca population site for monitoring purposes. These plots should be checked and recorded yearly. The monitoring program should provide comprehensive data on the entire population.

125. Establish communication and secure cooperation of mineral rights holders.

The mineral rights to the La Boca population belong to six private individuals. Communication and cooperation with these individuals needs to be established for the protection of the plant and management of its habitat.

13. Develop management strategies for known and new populations.

Several management strategies need to be addressed by FWS for protection of Knowlton cactus. These include routing of roads and oil and gas impact management.

131. Consider rerouting or closing the road near the La Boca population.

The rerouting or closing of the existing road near the La Boca population should be considered. This will reduce the potential for collecting this cactus by making access to the site more difficult.

132. Manage oil and gas exploration.

Although oil and gas exploration does not appear to be a present threat to the La Boca population, it was responsible for the destruction of six plants at the Reese Canyon site. If exploration is planned, the area to be affected should be surveyed to determine if Knowlton cactus is present.

1321. Survey for Pediocactus knowltonii in the Los Pinos River Valley and Reese Canyon area.

Before construction for a drilling site begins, an onsite survey for P. knowltonii must occur in the Los Pinos River Valley. The loss of the P. knowltonii plants at Reese Canyon area should be used as a costly but valuable lesson.

1322. Use slant drilling for oil and gas if necessary.

If P. knowltonii is found at a potential drill site, then slant drilling should be considered.

133. Exercise careful planning of new roads or any other development concerning P. knowltonii habitat.

No new roads should be built nor should any other surface development occur at the La Boca site. Care should be exercised in maintenance of the present road on the west side of the hill (see task 131). Roads planned for the future in the Los Pinos River Valley or Reese Canyon area should be surveyed for the Knowlton cactus.

2. Maintain viable populations in their natural habitat.

Due to the rarity of Knowlton cactus, all extant populations must be sustained in a healthy, vigorous state. A thorough knowledge

of the cactus' biology is needed to understand its habitat requirements. The knowledge gained can be used to help sustain healthy, natural populations.

21. Determine ecological requirements of Knowlton cactus.

Growth requirements and limiting factors need to be studied in detail. This will help provide information on management for the area.

211. Determine all mechanisms involved in seed dispersal.

It appears that running water may be the major factor in carrying seeds away from the parent plants. More study is needed to determine if birds, rodents, or other agents also play a role in the dispersal of Knowlton cactus seeds.

212. Determine the number of years involved in seed germination and the dormancy requirements.

The number of years before seeds germinate in their natural habitat is unknown, but apparently the seeds must undergo alternate freezing and thawing periods. Studies should be conducted to determine the exact germination and dormancy requirements of the Knowlton cactus seeds. Once this information is acquired, it should be published and made available to all private

and commercial cactus dealers. A higher success rate at germinating Knowlton cactus seeds might remove some of the collecting pressure on wild populations.

213. Determine what microhabitat factors are involved in seedling germination and establishment.

Some seeds become trapped between cobbles or pebbles and are covered by a thin layer of soil. Other seeds are carried by water and become lodged in the duff under a sagebrush, pinyon, or juniper plant. A thorough study of the edaphic factors necessary for seedling germination and establishment needs to be done.

214. Determine the rate of seed germination and the overall reproductive success of the taxon.

The percentage of seeds that germinate and the number of seedlings that grow to maturity is unknown. A study needs to be conducted to determine the percentage of seeds that germinate and the mortality rate of the Knowlton cactus seedlings.

215. Determine what insects are involved in the pollination of *Pediocactus knowltonii*.

The major insect pollinator of *P. knowltonii* is unknown.

Several ants have been seen crawling in and out of flowers and may act to some degree as pollinators (P. Knight 1981). When the Knowlton cactus is in bloom (late April), few insects are active.

216. Determine if there is a relationship between *Parmelia physodes* var. *vittata* and *Pediocactus knowltonii*.

Parmelia physodes var. *vittata* is quite prevalent in areas where the Knowlton cactus is the most common. Few Knowlton cacti are found where this foliose lichen is not growing. Any specific relationship between the Knowlton cactus and this lichen needs to be determined.

217. Determine the edaphic requirements of the Knowlton cactus.

A soil analysis of the La Boca site, where the Knowlton cactus grows, should be done and compared with soils from surrounding hills where it is not presently growing.

22. Search for new populations.

Potential habitat for the Knowlton cactus exists near Tiffany, Colorado. This region needs to be checked for the Knowlton cactus. Since a small population of eight Knowlton cacti were found near Reese Canyon, New Mexico, a concentrated effort should be exerted to see if other populations are in the area. There is potential habitat between La Boca, Colorado, and Navajo Dam, New Mexico. The habitat adjacent to the major population of

Knowlton cactus at the La Boca site, has been searched several times with no plants being found (P. Knight, NMNRD, pers. comm. 1984, M. Porter, SJCC, pers. comm. 1984). The Knowlton cactus grew naturally at two other locations but was extirpated due to collecting (R. Fletcher, USFS, pers. comm. 1982, P. Knight 1981). However, Prince Pierce and Bob Reeves, members of the New Mexico Cactus and Succulent Society, say the Knowlton cactus was never collected at either of these two locations (P. Pierce and R. Reeves pers. comm. 1982).

23. Reintroduce *P. knowltonii* onto protected public land within the historic range of the species.

Because *P. knowltonii* essentially exists at only one locality (belonging to TNC) which is very well known by cacti collectors, its survival is tenuous. It is fundamental to the recovery of this species to reintroduce it into potential habitat within its historic range. This task has received a priority one rating. Cuttings should be taken in the spring, hardened over the summer and set out in the fall. This procedure has about a 90 percent survival rate and will have little impact on the plants (S. Brack, cactus nurseryman, pers. comm. 1984).

Possible reintroduction sites have been identified on Federal, State, and private lands within the historic range of the species.

Selection of sites will depend upon species compatibility and the degree of protection afforded the various sites. The possibility of hybridization with other species at the site will be checked in order to protect the integrity of the gene pool.

3. Develop a comprehensive cactus trade management plan.

Prior to development of trade management strategies, studies are necessary to determine what species are in the trade, the overall trend of trade in listed cacti, the feasibility of reducing the collecting pressure on the wild populations by promoting a commercial, artificial propagation program and to determine strategies for effective implementation of law enforcement responsibilities of ESA, CITES, Lacey Act, and State laws. These studies should be national in scope and address all the cacti. The results will be used to develop a policy and a comprehensive trade management plan for all cacti.

31. Develop a trade study.

Document the source and identify the species in commercial trade so that trade management strategies can be developed. This would involve the investigation of the cacti dealers and catalogs and interviews with knowledgeable individuals.

32. Determine the impact of collecting.

Establish sample plots to monitor listed cacti and cacti suspected

of being affected by trade. Natural changes in populations as well as the success of recovery efforts would also be measured by the monitoring study. The impact of seed collecting and taking of cuttings are needed to understand harvest limits on the species.

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

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

34. Develop law enforcement strategy.

Evaluate issues involved in enforcing regulations regarding all listed cacti species. Special problems with listed cacti should be addressed in coordination with law enforcement to protect the species.

4. Develop public awareness, appreciation, and support for the preservation of the Knowlton cactus.

Education of the public is a vital part of this recovery process. The cooperation of the public is essential for the ultimate success of the foregoing recovery measures.

41. Increase the public's knowledge of Knowlton cactus.

An appreciation of the Knowlton cactus and its role in the environment needs to be developed. This can be accomplished through educational programs such as pamphlets, talk programs, and slide shows. Attempts will be made, however, to minimize the risk of disclosing the locations of the existing populations.

42. Enlist the support of public interest groups.

Public interest groups, especially local environmental and civic organizations, need to be involved. Such programs will not only expose the general public to the status of P. knowltonii, but will serve to focus attention on problems associated with endangered plants in general.

Literature Cited

- Backeberg, C. 1976. Cactus lexicon. 3rd Ed. Blandford Press, Poole, Dorset, England. 828 pp.
- Benson, L. 1961. A revision and amplification of Pediocactus I. Cact. Succ. Jour. 33:49-54.
- _____. 1982. The Cacti of the United States and Canada. Stanford University Press, Stanford, California. 1044 pp.
- Earle, H. 1980. Cacti of the Southwest. Ironwood Lithographers, Inc. Scottsdale, Arizona. 210 pp.
- Foster, R. 1979. Physical geology. 3rd Ed. Charles E. Merrill Publishing Company, Columbus, Ohio. 447 pp.
- Knight, P. 1981. Rare, threatened, endangered, and other plants of concern in the BLM Chaco-San Juan planning area of northwestern New Mexico. New Mexico Department of Natural Resources Heritage Program, Santa Fe, New Mexico. 293 pp.

PART III

IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows is a summary of scheduled actions and costs for the Knowlton Cactus Recovery Plan. It is a guide to meet the objectives of the recovery plan for the Knowlton Cactus, as elaborated upon in Part II, Narrative. This schedule indicates the general category for implementation (I = information gathering; M = management; A = acquisition; O = other), recovery plan tasks, corresponding action outline numbers, task priorities, duration of the tasks ("ongoing" denotes a task that once begun should continue on an annual basis), the agencies that are responsible to perform these tasks, and lastly, the estimated costs for FWS tasks. Part III is the action portion of the recovery plan, that when accomplished, should bring about the recovery of the endangered Knowlton cactus and protection of 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 the species.

GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES

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

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

- BLM - Bureau of Land Management
 FWS - U.S. Fish and Wildlife Service
 SE - Office of Endangered Species
 LE - Law Enforcement
 RE - Realty
 TNC - The Nature Conservancy
 NM - State of New Mexico

PART III

IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY		FISCAL YEAR COSTS (EST.)*			COMMENTS	
					FWS REGION (6)	PROGRAM (6a)	OTHER (7)	FY 1 (8)	FY 2		FY 3
02	Enforce existing regulations.	11	1	ongoing	2	LE	BLM	1,000	1,000	1,000	
M3	Maintain a fence.	121	2	ongoing	2	SE	BLM TNC	250	250	250	
M3	Secure cooperation between FWS and TNC.	122	1	1 year	2	SE RE	TNC	1,000			
01, I1	Contact adjacent land-owners.	123	2	1 year	2	SE		500			
I1, I2	Monitor known populations and potential habitats.	124	2	ongoing	2	SE	BLM TNC	1,000	500	500	
M3	Establish communication with mineral rights holders.	125	2	ongoing	2	SE	TNC	500	500	500	
I4, M2, M3	Develop management strategies for known and new populations.	13	2	1 year	2	SE	BLM TNC	5,000			
I2, I4, I10, I11	Determine ecological requirements of Knowlton cactus.	21	2	2 years	2	SE		20,000	5,000	5,000	
I2	Search for new populations.	22	3	3 years	2	SE	BLM	5,000	5,000	5,000	

*Costs refer to USFWS expenditures only.

PART III

IMPLEMENTATION SCHEDULE

GENERAL CATEGORY (1)	PLAN TASK (2)	TASK # (3)	PRIORITY # (4)	TASK DURATION (5)	RESPONSIBLE AGENCY			FISCAL YEAR COSTS (EST.)*			COMMENTS	
					FWS REGION (6)	PROGRAM (6a)	OTHER (7)	FY 1 (8)	FY 2 (8)	FY 3 (8)		
M2	Reintroduce P. <u>knowltonii.</u>	23	1	3 years	2	SE			10,000	5,000	5,000	
R14	Develop a trade study.	31	2	1 year	2	SE			20,000			
R1	Determine the impact of collecting.	32	2	ongoing	2	SE			20,000	10,000	10,000	(9)
R7	Determine feasibility of reducing collecting pressure by promoting artificial propagation program.	33	2	1 year	2	SE			15,000			
02	Develop law enforcement strategy plan.	34	2	1 year	2	SE LE			2,000			
01	Develop public awareness.	4	3	ongoing	2	SE	TNC		5,000	1,000	1,000	

*Costs refer to USFWS expenditures only.

APPENDIX

List of Reviewers

An agency review draft of the Knowlton Cactus Recovery Plan was sent to the following agencies for their review on February 1, 1984.

Secretary, New Mexico Department of Natural Resources
New Mexico Director, The Nature Conservancy
New Mexico State Director, Bureau of Land Management
Superintendent, Mescalero Agency, Bureau of Indian Affairs
Botanist, U.S. Forest Service, Region 3
Division of Wildlife Research, USFWS, Washington, D.C.
Ecological Services, Albuquerque Field Office, USFWS, Region 2

A second agency draft was sent to the following agencies for their review on October 16, 1984.

New Mexico State Director, Bureau of Land Management
Secretary, New Mexico Department of Natural Resources
Public Service Company of New Mexico
New Mexico Director, The Nature Conservancy
Western Land Steward, The Nature Conservancy
Director (AFA), USFWS, Washington, D.C.
Law Enforcement, USFWS, Region 2
Realty, USFWS, Region 2
Ecological Services, Albuquerque Field Office, USFWS, Region 2

Comments Received

Letters of comment on this plan have been reproduced in this section, followed by an outline of the responses made to each comment.



UNITED STATES
DEPARTMENT OF THE INTERIOR

BUREAU OF INDIAN AFFAIRS
Mescalero Agency
Mescalero, New Mexico 88340

	REPLY REFER TO:
Curley	RD
Johnson	DRD
Hartman	AA
Kolodiski	AFF
Landwehr	AMR
KAYSER	AMR
Horn	LE
P. Hill	LE
SANCHEZ	PAO
	FEO
	FILE
	CL

FEB 13 1984
PO Peggy

Memorandum

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

From: Superintendent, Mescalero Agency

Subject: Agency Review Draft Recovery Plan

A-1

In response to your request for comments concerning the review draft of the Knowlton Cactus Recovery Plan, we have reviewed the information contained in the draft. We have no immediate comments to submit. The report appears to be both thorough and well prepared.

However, we agree with and strongly support these efforts, because the key to orderly preservation of endangered genus of the Knowlton Cactus, Pediocactus Knowltonii, and the crucial survival of the species is essential for the ultimate success of the foregoing recovery measures.

We appreciate the opportunity to review the proposed draft recovery plan.

Fred R. Lujan
Superintendent

FWS REG 2
RECEIVED

FEB 14 '84

SE

REC'D
FWS-Region 2

FEB 13 1984

AFF



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
NEW MEXICO STATE OFFICE
P.O. BOX 1449
SANTA FE, NEW MEXICO 87501

Handwritten notes in the top right corner include a signature and the word "SANCHEZ".

IN REPLY REFER TO

7170 (931)

RD
DRD
AA
L AFF F
AWR
AHR
LE
PAO
EEO
2. FILE SE
CI

MAR 28 1984

Memorandum

To: Regional Director, Region 2, FWS, Albuquerque, NM
From: Deputy State Director, Lands and Renewable Resources, BLM, Santa Fe, NM
Subject: Review of Draft Recovery Plan

As requested, the following review comments are offered on the draft recovery plan for Knowlton cactus (Pediocactus knowltonii).

B-1

P. 10, (Second paragraph) - Explain what a seed bank is and what relation this has on the natural population.

B-2

P. 27, (No. 122) - Fencing and "No Trespass" signs may do more harm than good in protecting the site from collectors. The enforcement and control of access in or near the habitat site will be an administrative problem. Controlling access into known collection areas may be better controlled by locking gates in strategic locations than fencing off the site.

B-3

P. 28, (No. 1232) - Adjacent landowners (private land owners) need to be informed as to who the "proper authorities" are.

B-4

P. 35, (No. 23) - The two sites mentioned at the end of this paragraph may be suitable for any future relocations or transplants.

B-5

Pp. 16-17, (Oil and Gas Exploration) - Suggest the following sentence be added: An investigation of the site by the U.S. Fish and Wildlife Service and BLM indicated that Section 7 of the Endangered Species Act was not intentionally violated.

B-6

P. 29, (No. 13) Monitoring ideas are good.

B-7

Part III - Implementation Schedule. - The fencing cost (FY 1 - \$20,000) seems overpriced for less than a mile of fence. Also, the cost for a sign (\$5,000) seems high.

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

David A. Jones

FWS REG 2
RECEIVED

MAR 30 '84

REC'D
FWS-Region 2

MAR 29 1984

AFF

SE

The Nature Conservancy

New Mexico Field Office
Post Office Box 1846 / Albuquerque, New Mexico 87103
610 Gold S.W., Suite 216
(505) 242-2015

February 8, 1984

Dr. James E. Johnson
Acting Assistant Regional Director
U. S. Fish & Wildlife Service
P. O. Box 1306
Albuquerque, New Mexico 87103

End. Sp. R-2
<input checked="" type="checkbox"/> JOHNSON
<input type="checkbox"/> Bowman
<input type="checkbox"/> Carley
<input type="checkbox"/> Haverson
<input type="checkbox"/> Hoffman
<input checked="" type="checkbox"/> Johnson
<input type="checkbox"/> Kayser
<input type="checkbox"/> Hood
<input type="checkbox"/> Padilla
<input type="checkbox"/> SANCHEZ

FD
P. Perry

Dear Dr. Johnson:

I have reviewed the agency review Draft Recovery Plan for Pediocactus knowltonii and have the following comments:

C-1

1. We are not interested in Fish and Wildlife Service or any other agency publicly stating the location of Pediocactus knowltonii. If this is a document that would be available to the public, we would prefer that the location simply be stated as "San Juan County, New Mexico". Even though we know that many cactus and succulent aficionados already know the site and the location, we are not interested in disseminating information about this cactus. Unfortunately, Ken Heil has already put this in writing and we must simply trust that the Fish and Wildlife Service will not distribute this information to persons other than The Nature Conservancy, or distribute it as an in-house document. I assume this is the case anyway, but I wanted to at least make this clear with you.

C-2

2. Yes, The Nature Conservancy will make an effort to ensure that mineral right owners at the La Boca site will not engage in any activity which might have an adverse affect on the La Boca population.

C-3

3. I notice that Ken Heil suggests that Fish and Wildlife Service develop public awareness, appreciation and support for the preservation of the Knowlton cactus. Frankly, we oppose any suggestion that pamphlets, talk programs or slide shows be developed to solicit support for the cactus as we believe that it would only take a few people with the wrong motives to extirpate this population. I plan on meeting with your recovery team to discuss this further. I realize that this is a somewhat controversial topic and I would hope that we could come to an agreement about dissemination of information on Knowlton's cactus.

C-4

4. Yes, we are planning on erecting a fence around the Knowlton's cactus site at La Boca and we plan on doing this sometime this spring, 1984.

C-5

5. We have not made a final decision yet about whether or not to display "no trespassing" signs. I would like the recovery team to discuss the use of "no trespassing" signs and their psychology. In addition to collectors, we are not interested in universities or other

National Office
1800 North Kent Street
Arlington, Virginia 22209



FEB 13 '84

SE

Western Regional Office
156 Second Street
San Francisco, California 94105

FWS RES 2
RECEIVED

interested groups walking around the La Boca site. The only people that should enter the area are people who are there to do research on the cactus as agreed upon by the recovery team. No other research should be necessary and certainly we plan no field trips for our members to the area nor do we have any intentions of informing our own membership of the specific locality of these plants.

- C-6
6. I have no problem with some simple literature being developed that could be passed out to adjacent landowners who could conceivably find some new plants on their property. I agree that it would be great if we could make some friends at the La Boca populations who could help prevent illegal collecting.
- C-7
7. I am concerned about the encouragement of adjacent landowners to search for new populations. I realize this is not The Nature Conservancy's business to have this concern except that this seems highly unscientific to rely on information from non-biologists. At the same time, it seems like a good idea to encourage landowners to know what the cactus looks like and to report any new populations to the Fish and Wildlife Service as long as the Fish and Wildlife Service is not depending on these landowners to come up with new populations.
- C-8
8. I do not think it is a good idea to publicize to landowners that rewards would be made available for identifying would-be collectors. Any time that money is offered to people, people's motivations can be convoluted and it gives people the idea that the cactus themselves may have some economic value.
- C-9
9. We certainly encourage the artificial propagation of Knowlton's cactus but we would want to approve the selection of whoever would be entering our land to make collections of seeds or taking material for cloning or grafting. Furthermore, we would hope that a reasonable formula would be developed so that greenhouse reared material could be introduced to new locations which should prove to be productive and we also approve of the introduction of seed material to the cactus trade to reduce demand on the species.
- C-10
10. In your implementation schedule under Plan Task, it is stated that an allocation is proposed to fence the area. Does the Fish and Wildlife Service have money to fence the Pediocactus knowltonii site? If this is so, I would appreciate learning from you as soon as possible about this. We are hoping that the site could be fenced sometime this spring. As you know, there has been some discussion about building a misleading fence out there to deter potential collectors. I personally think it

Dr. James E. Johnson
Page Three

would be better to fence the area itself in a low key manner. Our interest and secrecy, we believe, is important until the cactus has been thoroughly studied and enough new material has been raised and reintroduced and demand for the cactus also reduced so that the status of the plant has changed in a positive way.

I am planning on calling a meeting of the persons who should have some say prior to The Nature Conservancy constructing a fence this spring. If, however, the Fish and Wildlife Service has the money to do the fencing, this would change the situation considerably and we would expect the Fish and Wildlife Service to call The Nature Conservancy to seek permission to fence the area.

We are pleased that the Fish and Wildlife Service has an active interest in this rare species and we look forward to working with you.

Sincerely yours,



John C. Egbert
State Director

JCE/mh

cc: Don Duprey - WRO
Dick Dewey - WRO



United States Department of the Interior

BUREAU OF LAND MANAGEMENT NEW MEXICO STATE OFFICE

Post Office and Federal Building

P.O. Box 1449

Santa Fe, New Mexico 87504-1449

NOV 9 1984

6840 (931)

End. Sp. R-2	
<input checked="" type="checkbox"/> JOHNSON	
LANCZOS	
McMan	
DeLo	
Collis	
Haltvors	
Holman	
<input checked="" type="checkbox"/> Olveil	
Thifford	
Battinist	
Hopp	
Pedilla	
SANCHEZ	
FILE	

Memorandum

To: Assistant Regional Director, Region 2, FWS, Albuquerque, NM

From: Deputy State Director, Lands and Renewable Resources, BLM,
Santa Fe, NM

Subject: Knowlton Cactus and Kuenzler Hedgehog Cactus Draft Recovery Plans

We have reviewed the subject recovery plans and have no comments.

We are aware that these plants occur on public lands administered by our agency and we will continue to cooperate with the Fish and Wildlife Service in these efforts.

Thank you for the opportunity to review the subject recovery plans.

David A. Jones

FWS REG 2
RECEIVED

NOV 14 '84

SE

The Nature Conservancy

Western Regional Office
785 Market Street, San Francisco, California 94103
(415) 777-0541

December 4, 1984

Conrad A. Fjetland
Assistant Regional Director
U.S. Department of the Interior
Fish and Wildlife Service
P.O. Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Fjetland:

We appreciate the opportunity to comment on the second draft of the Pediocactus knowltonii Recovery Plan. Our comments follow:

E-1 Our only general problem with the overall plan is that it doesn't say who will do what and when. Also, statements implied to be fact are not always referred.

E-2 Pp. 1./Introduction - First paragraph, last sentence: We suggest that the critical status of the P. knowltonii be clearly spelled out since there is only one, small, viable occurrence in the world.
Recommendation: change the last sentence to read:

"P. knowltonii is the smallest member of the genus. This cactus species occurs in only two small locations in the world, only one of which is viable. Both locations are in northern New Mexico."

E-3 Pp. 4./Distribution - Recommended change:
"This locality contains the only viable population (3,000 to 7,000 plants) of P. knowltonii. A second population, consisting of two plants in 1984, is located in Reese Canyon in San Juan County, New Mexico. The origin of this second population is thought by Paul Knight to be the result of the transplants by the New Mexico Cactus and Succulent Society in 1960 (pp. 12, A)."

E-4 Pp. 4./Land Ownership - Suggest to clarify:
"In an effort to...acres of land surrounding the center of the population to The Nature Conservancy (TNC)."

E-5 Pp. 6./A Demography: The population estimate of 3,000 conflicts with the estimate of 7,000 on page 4. This should be resolved.

We have the following suggested additions to clarify meaning:
E-6 "This fluctuation is thought to be due to...collection."
"The primary factor...the number of collectors visiting the site decreased."

NFC 13 84

National Office, 1800 North Kent Street, Arlington, Virginia 22209



E-7 Pp. 7./2. (a) Area of the La Boca population - Comment: This hectare figure inadvertently is deceiving. We do not know at this time the actual area of the fenced preserve; the fee land has not been surveyed; and we do not know the area within the preserve where the plants occur. The "4.15 hectares" is obviously an estimation by somebody. Stating in writing that the plants cover 4.15 hectares of land could tie us into future misconceptions since this figure may someday be construed as a known baseline value, which it is not. Recommendation: State an estimated range of areas such as:
"Estimated to be 4 hectares with the highest densities within less than 0.5 hectare."
Paul Knight is undoubtedly best able to make these approximations. Facts such as these should be referenced since this plan itself will undoubtedly be often referenced.

E-8 Pp. 7./ (b) Density: A sentence should be added to indicate that the highest density of plants are centered within a very small area of the preserve with densities decreasing rapidly as one moves away from this center.

From my understanding of possible plant population parameters I would change the last sentence:

"This uneven distribution may be the result of seed dispersion (Knight, 1981); some as yet unknown relationship between P. knowltonii and the lichen Parmelia physides (Knight, personal communication); or some other features of the microhabitat that influences seedling establishment or growth."

E-9 Pp. 8./ (e) First paragraph - Recommendation:
"Since 1980 the collecting pressure is thought to be less; seeds in the..."

Also:

"If private and commercial...cactus is expected to continue to..."

E-10 Pp. 8./ B. Phenology: As in Section A and throughout the report, the use of terminology that implies facts without references is very disturbing. It is important that we know the information source!

E-11 Pp. 12./ D. Insect vectors: I watched and photographed a native bee inside a Knowlton cactus flower in the spring of 1984.

E-12 Pp. 12./ A. Collecting - Comment: Paul Knight told us that many of the "rescued" plants were thought to have been planted in numerous other areas in the hopes that they would "take". Paul felt that the BLM Reese Canyon population was probably one of these transplanted populations since it occurs next to a road in an area unlike that of the La Boca population. If either true or conjecture by Paul (a highly respected expert) it seems important to add this insight into this Recovery Plan since this information has considerable bearing not only on the "second population's" value, but also to the Recovery Plan's goal to establish other cactus protection programs.

E-13 Pp. 14./Top paragraph, last sentence - Comments: The very real tragedy of the collecting threat is only lightly treated here. The collecting threat is the serious threat. So stated, emphasis should be redirected with stronger language (with reference to Paul, Reggie Fletcher and others).

Recommendation:

"If collecting continues to annually remove reproducing adults, as is the suspected case, then annual recruitment and establishment of seedlings may fail or significantly decrease. This would result in a rapidly and steadily diminishing population."

"The present and only viable population in the world is so situated and the location so well known that in any given year one person alone could easily collect every adult cactus into a sack in only a few hours. Unless other occurrences are discovered, which is highly doubtful given the number and area of accomplished field surveys, Pediocactus knowltonii may be on the brink of extinction within a few years due to collecting pressure alone."

E-14 Pp. 14./B. Oil and gas exploration - Last paragraph: I disagree with the first sentence since we do not know the extent of the original population that was collected in 1960. Since the present population occurs on the slopes, there is every likelihood that the present gas well and pad on the edge of the preserve is within the former range of the population. If Paul Knight agrees with this assertion it is important to recognize it in the Recovery Plan. This is because we would then be saying that a gas well has already limited the population by inadvertently being within the plant's probable former (1960) range.

E-15 Pp. 15./Top of page - Change this sentence to read:
"TNC hopes to obtain cooperation from the six energy firms holding mineral rights beneath the land (Egbert, personal communication)."

Pp. 16./Between E. and F. - An addition: We recommend adding a serious threat that was not included in the draft Recovery Plan. After E, add the following:

E-16 "F. Trampling by Researchers, visitors and other people. The P. knowltonii plants at La Boca occur in a relatively small area in large numbers, and are very difficult to see. It is next to impossible to avoid stepping on some plants. This is true of the tiny juveniles, but also of the adults, especially when they are not in flower. Since only a small percentage of the population is in flower on any particular day during the very short flowering season, the danger of population damage to human trampling is real. For example, during the fencing reconnaissance and construction visits in 1984 such damage was easily seen despite the fact that everyone was very careful and the time spent in the population was minimal."

"On other fragile natural areas such as Mexican Cut, managed by the Rocky Mountain Biological Laboratory in Colorado, the incidental/accidental trampling by researchers alone was cause enough not only to restrict research, but damage was such that the entire area was closed during one season to allow recovery. With P. knowltonii, however, a crushed plant will not recover."

- E-17 Pp. 16./F. Natural Threats - Would become: G. Natural Threats.
E-18 Pp. 17./4.: I object to a figure like "99%". Why not 97%, 76%, or any other high number? Suggestion:
"...a single catastrophe could eliminate all, or nearly all of the known plants from this only known population."

- E-19 Pp. 18./Part II. Recovery: This page needs rewriting to emphasize the reality of the crisis and establish reasonable goals, objectives and general methods. The first paragraph implies that both populations are viable. It is my understanding from everyone concerned that only the La Boca population has a chance. Also, as an implied goal, we very much object to a speculation that there is a set carrying capacity "goal" when the knowledge to make such an assertion is not known.

Additionally, there is not the importance given in the first three introductory paragraphs concerning our agreed upon primary objective. That is, to assure species survival, other viable populations must be established.

We suggest that the introductory Recovery statements on page 18) (the first three paragraphs) be completely rewritten. The following is our suggested rewrite for all of page 18:

Part II

RECOVERY

The main goal of this recovery plan is to restore Pediocactus knowltonii to non-endangered status.

To implement this goal the following objectives are necessary:

1. Assure the protection and enhancement of the only viable, natural population, the La Boca population.
2. Develop the methods needed and implement a transplant program to successfully establish at least two other viable populations in similar habitats on protectable public land.
3. Permit the commercial raising of P. knowltonii to lower the plant's dollar value.
4. Establish FWS policy on the cactus trade problem.

The methods or actions needed to accomplish the objectives to achieve the protection goals above include the following:

1. Prevent or reduce illegal collection at the La Boca site through enforcement, patrols, cooperative agreements, increasing the number of viable populations by transplanting, and promoting the raising of the species by commercial growers.
2. Population monitoring at the La Boca site to indicate population and age class trend.
3. This will indicate the success of the protection program.

Suspected Biological Limiting Factors Needed to Manage the Species and It's Habitat:

4. Establish cooperative relationships with necessary private and public agencies to protect, conserve and expand the species. These shall include, but not be limited to beneficial relationships between USFWS, BLM, State Parks, local enforcement agencies, neighbors, TNC and select cactus growers.
5. Permit commercial growers to produce the plant for the purpose of sale to the public. The intent is to lower the value of individual plants, thus reducing the desire of poachers to collect from the wild population.
6. Study and develop a FWS policy on cactus trade.

Downlisting and delisting criteria cannot be established at this time because there is little biological data on the species and there is only one viable natural population. More research is necessary, and at least one other population needs to be established in order to quantify downlisting criteria.

Pp. 19. Step-Down Outline: For your consideration I have attached a copy of the draft with my comments.

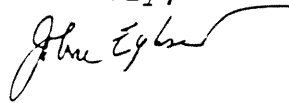
E-20

Since TNC owns the La Boca site, the management of the population will need to be worked out in the Cooperative Agreement between TNC and FWS. This will not only be mutually beneficial and should do what is necessary to conserve and protect the species, it will also realign the step-down actions in the draft.

Thank you for the opportunity for inter-agency cooperation on this important recovery plan. We look forward to your very necessary assistance in our mutual effort to manage and protect this species and its one wild habitat.

If we can be of further assistance, please contact us.

Sincerely,



John Egbert
Director New Mexico
Field Office

~~Enclosure~~

cc: ✓ Peggy Olwell.
Bob Jenkins

Responses to Comments

- A-1 Comment noted.
- B-1 Suggestion incorporated.
- B-2 The Nature Conservancy, in coordination with several botanists, decided it would be best to fence their site in a manner similar to other ranch fences in the area. In addition to fencing the site, several alternatives to alleviate traffic through the area have been discussed and as yet not implemented.
- B-3 Suggestion was incorporated.
- B-4 The Service agrees that these two locations may be suitable reintroduction sites.
- B-5 Suggestion was incorporated.
- B-6 Comment noted.
- B-7 Comment noted.
- C-1 The Service understands the need for confidentiality and has no intention of publicly stating the location of P. knowltonii.
- C-2 Comment noted.
- C-3 The Service believes that education of the public is a vital part of the recovery process. However, the programs that will be developed will not disclose P. knowltonii localities and will focus attention on the importance and the conservation of threatened and endangered plant species.
- C-4 Comment noted.

- C-5 The Service agrees that access into the TNC site should be limited to those persons conducting research on the species as addressed in the recovery plan.
- C-6 Comment noted.
- C-7 The Service is not depending solely upon adjacent landowners to find new populations but with Federal monies and personnel limited, these people can provide valuable data at little or no cost to FWS or themselves.
- C-8 Suggestion was incorporated and the statement was deleted.
- C-9 The Service will work cooperatively with TNC on this phase of the recovery of P. knowltonii.
- C-10 The identification of a task and its estimated cost in the implementation schedule of the draft recovery plan does not necessarily mean that the funds are available at that time. The funds are not presently available for the fencing task.
- D-1 Comment noted.
- E-1 Part III, the implementation schedule, is the part of the recovery plan where each individual task is identified along with the responsible agency. The date when each task is implemented is contingent upon available funds from either the FWS or the other responsible agency.

- E-2 Suggestion was incorporated.
- E-3 Suggestion was incorporated.
- E-4 Suggestion was incorporated.
- E-5 Corrected.
- E-6 Suggestions were incorporated.
- E-7 The Service did not mean to imply that the areal measurement given was the area of the fenced TNC preserve. It is merely the estimated area of land that the cactus inhabits. With the increase of plants in the La Boca population, the estimated area of land inhabited by P. knowltonii has increased to 5 hectares with the highest densities within less than 1 hectare.
- E-8 See E-7
- E-9 Suggestions were incorporated.
- E-10 Suggestion was incorporated.
- E-11 Suggestion was incorporated.
- E-12 Suggestion was incorporated.
- E-13 Suggestion was incorporated.
- E-14 The sentence remains as is. The Service did not state that the gas well and pad are not in the former range of the species. The gas well is located in a sagebrush area which is poor habitat for P. knowltonii.
- E-15 Suggestion was incorporated (see E-3).
- E-16 Because TNC owns this land and has requested to limit access into the site to only those persons conducting research addressed in the recovery plan, it is unlikely that any persons other than the researchers will be on the site and these knowledgeable individuals will consider their impact on the species and its habitat.

E-17 See E-16

E-18 Suggestion was incorporated

E-19 The entire page was not rewritten as suggested, because FWS policy has not yet been established on cactus trade. Some of the suggestions were incorporated.

E-20 Suggestions were incorporated when appropriate.