Dudley Bluffs Bladderpod

Recovery Plan

U.S. Fish & Wildlife Service

Dudley Bluffs Twinpod

DUDLEY BLUFFS BLADDERPOD (*Lesquerella congesta*)
DUDLEY BLUFFS TWINPOD (*Physaria obcordata*)

RECOVERY PLAN

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LITERATURE CITATION

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EXECUTIVE SUMMARY

Current Status: The Dudley Bluffs bladderpod (*Lesquerella congesta*) and the Dudley Bluffs twinpod (*Physaria obcordata*) are endemic to the Piceance Basin in Rio Blanco County, Colorado. These members of the mustard family are known from five major populations each, two of which occur together. Most sites are on public land administered by the Bureau of Land Management, with the remainder on private land or Colorado Division of Wildlife land. Both species grow on oil shale outcrops in the multimineral oil shale zone, an area containing rich deposits of oil shale and sodium minerals (nahcolite and dawsonite). If project designs for development of these deposits do not include plans for conservation of these plants, both species could be significantly impacted.

Habitat Requirements and Limiting Factors: The plants are naturally limited to the small existing area of suitable habitat (geologic strata) in the Piceance Basin. Range expansion is probably not natural or possible. Protection of small existing populations is vital.

Recovery Objective: Conservation of existing populations. Because of small natural populations and limited habitat, recovery of these two species is uncertain. For the foreseeable future, the recovery objectives for these two species will be to conserve their existing populations and habitats.

Actions Needed:

1. Inventory any remaining potential habitat.
2. Establish formal land management designations to maintain and protect existing populations on public land.
3. Protect sites on private land with land exchanges and/or conservation easements.
4. Conduct life history/ecology research and soil analysis.
5. Monitor trend of existing populations with permanent plots.

Date of Recovery: Unknown

Cost of Recovery: Unknown

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PART I

INTRODUCTION

Description

The Dudley Bluffs bladderpod (Lesquerella congesta) and the Dudley Bluffs twinpod (Physaria obcordata) were listed as threatened on February 6, 1990 (55 F.R. 4152). These new species of wild mustards, were discovered in 1982 during a floristic inventory of the Piceance Basin conducted by the Colorado Natural Heritage Inventory for the Bureau of Land Management (Bureau) (Colorado Natural Areas Program 1987). An earlier collection of L. congesta, unrecognized as such, was made in 1959. The two species were subsequently described by Dr. Reed Rollins, an expert on plants in the mustard family, who visited the Piceance Basin and observed these species at Dudley Bluffs in 1983 (Rollins 1983, Rollins 1984). With the exception of the recently described Penstemon debilis (O'Kane and Anderson 1987), a candidate species, these two herbaceous perennials are the rarest of several oil shale plant species in the Piceance Basin.

Lesquerella congesta is an extremely small cushion plant only 1-3 centimeters (0.4-1.2 inches) in diameter with fruiting stems up to 1.5 centimeters (0.6 inches) tall. The cushion growth habit is an adaptation to erosive badland soils, and has evolved independently in several unrelated taxa in this area. L. congesta has small, linear, entire, silvery leaves 8-13 millimeters (0.3-0.5 inches) long, bright yellow flowers, and rounded, pubescent fruits 2.5-3.5 millimeters (0.10-0.14 inches) wide.

Physaria obcordata is 12-18 centimeters (4.8-7.2 inches) tall with oblanceolate, entire leaves 1.0-1.5 centimeters (0.4-0.6 inches wide) and 4.0-8.0 centimeters (1.6-3.8 inches) long, with a silvery sheen due to a dense covering of overlapping, dish-shaped trichomes. It has yellow flowers, 7-9 millimeters (0.3-0.4 inches) long, and slightly inflated, heart-shaped (obcordate) fruits.

Distribution

In 1986, the Colorado Natural Areas Program followed up on the 1982 inventory by conducting field work on P. obcordata to determine its rarity and range (Colorado Natural Areas Program 1987). Sites of L. congesta were delineated at the same time. During this survey, populations of both species were found for the first time along Yellow Creek, the next drainage west of Piceance Creek and about 5 miles away. The largest known populations of both species, approximately 10,000 individuals each, were discovered growing together at the junction of Piceance Creek and Ryan Gulch, 2 miles north of Dudley Bluffs (see Figure 1). Between the 1982 inventory and the 1986 survey, all major drainages in the Piceance Basin were surveyed. Both species were found only along Piceance and Yellow Creeks, and the twinpod at Calamity Ridge. During

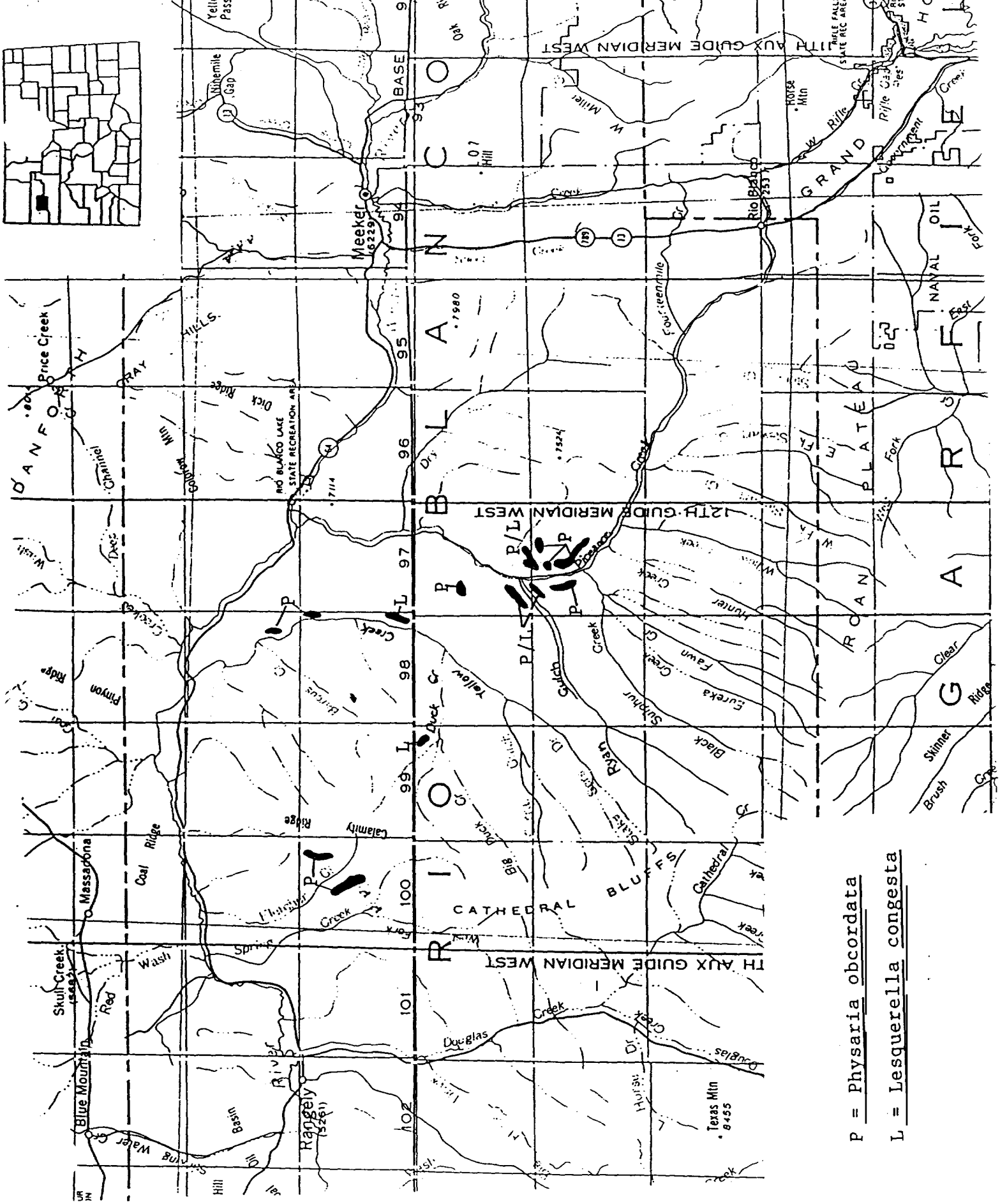

Figure 1. Distribution of Physaria obcordata and Lesquerella congesta.

the 1988 field season, John Anderson, then a botanist with the Service, visited all the wild mustard sites and more precisely delineated their geological habitat. L. congesta has five populations on approximately 50 total acres over a range of 10 miles. P. obcordata, which occurs on outcrops further upstream of Piceance Creek and downstream on Yellow Creek, has a range of 15 miles as well as occurring on two sites on Calamity Ridge. There are a total of five major populations of P. obcordata on approximately 250 acres. The Dudley Bluffs and Ryan Gulch sites, which are only 2 miles apart, contain most members of the species.

The Dudley Bluffs bladderpod and twinpod occur mostly on land administered by the Bureau. Less than 10 percent of each species occurs on private or State land. Portions of the Dudley Bluffs site are on private land (containing twinpod) and a portion of the Yellow Creek sites are on Colorado Division of Wildlife land (containing bladderpod).

Habitat/Life History

These two rare mustards grow along drainages in the Piceance Basin, on barren white outcrops exposed through erosion from downcutting of streams. Each species, however, has a slightly different microenvironment. While the twinpod grows on steep sideslopes, the bladderpod grows above it on level surfaces at the points of ridges; the bladderpod also occurs by itself where narrow outcrops of level white shale are exposed. Because more sideslope habitat is available (for instance, there is no ridgepoint habitat at Calamity Ridge), the bladderpod is the rarer of the two species.

The strata exposed in the Piceance Basin are derived from the Eocene Green River and Uinta Formations (Cashion and Donnell 1974). The rich, oil-shale-bearing Green River Formation is a fine-textured shale formed from a lacustrine deposit in Lake Uinta. Later, Lake Uinta filled with sand and silt deposits, which formed the coarser-grained overlying Uinta Formation. Thus, the surface of the Piceance Basin is filled with the Uinta Formation above and the thick shale beds of the Parachute Creek member of the Green River Formation below. The shale rims of the Piceance Basin, such as Calamity Ridge, are formed from upturned strata of the Green River Formation.

At the interface of the two formations, in the middle of the Piceance Basin, the lakebed Green River Formation shale intertongues with the deltaic and fluvial sandstones and siltstones of the Uinta Formation. For instance, at Dudley Bluffs, the type locality of the two species, the ridge and hillside supporting the bladderpod and twinpod is formed by strata of Unit 5 of the Uinta Formation on the top and Unit 4 at the base, with the Thirteen Mile Creek Tongue of the Green River Formation on the midslope where the twinpods grow. The bladderpod only occurs at or near the end of the ridge where erosion has removed the overlying Unit 5 from the point as the ridge recedes. Along Yellow Creek, the Dudley Bluffs bladderpod and twinpod grow primarily on other narrow tongues of white shale within the Uinta Formation, whereas at

Calamity Ridge the twinpod grows on outcrops of the Parachute Creek Member of the Green River Formation. Elevational ranges for these species are 1,860-2,010 meters (6,140-6,644 feet) for L. congesta and 1,806-2,255 meters (5,960-7,440 feet) for P. obcordata. The surrounding hills and mesas support pinyon-juniper woodlands.

Reasons for Listing

Lesquerella congesta and P. obcordata grow on tongues of white Green River shale within the overlying Uinta Formation, which is considered overburden to the thick underlying oil shale deposits. Except for the Calamity Ridge sites, all the occurrences are within the multimineral oil shale area. Beneath the overburden of the surface Uinta Formation, this area at the center of the Piceance Basin contains thick, rich sections of oil shale in the mahogany zone and the sodium minerals nahcolite (sodium bicarbonate) and dawsonite (a potential source of alumina) in the underlying saline zone. L. congesta and P. obcordata are vulnerable to impacts resulting from future development and extraction of these oil shale minerals and associated activities.

Portions of the multimineral oil shale area, including Dudley Bluffs, Ryan Gulch, and Yellow Creek, overlay oil shale deposits that are potentially recoverable by open-pit mining (Bureau of Land Management 1984). The rest of the area is suitable for underground mining of oil shale. A pilot project for a nahcolite solution mine has been constructed on Bar D Mesa between Piceance Creek, Yellow Creek, and Ryan Gulch, and a 125,000 tons per year commercial mine, including evaporation ponds and a pipeline, has been proposed that would cover 254 acres (Bureau of land Management 1986, Bureau of Land Management 1987a). Currently, the Bureau is reserving the multimineral area from commercial leasing until improved multimineral recovery technology is developed. However, leases for noncommercial research tracts not exceeding 2,000 acres still will be considered. Because of the massive scale of potential development in the limited area in which L. congesta and P. obcordata occur, a significant portion of the habitat of these two wild mustards would be destroyed and/or modified and their range possibly curtailed if development occurs. Up to 100 and 72 percent of the acreages on which L. congesta and P. obcordata occur, respectively, could be developed. There is already a designated linear utility corridor for pipelines, transmission lines, and roads along Ryan Gulch (Bureau of Land Management 1987b), and potential corridors exist along Dudley Gulch, Piceance Creek, and Yellow Creeks (Bureau of Land Management 1984). One of the Calamity Ridge sites has already been bisected by a road (Colorado Natural Areas Program 1987).

These species' pattern of rarity, being locally abundant on small areas of specialized habitat, makes them particularly vulnerable to surface disturbances despite their high densities.

Conservation Measures

The Bureau has designated the Federal portions of the Dudley Bluffs site and one of the Calamity Ridge sites (Yanks Gulch) as Areas of Critical Environmental Concern (ACEC) (Bureau of Land Management 1987b). Designation as an ACEC means that the Bureau develops a habitat management plan that gives priority to the resources and values for which the ACEC was designated (in this case, the rare plants). Other uses are not prohibited but may be restricted if they conflict with the values given priority in the ACEC. Therefore, the Bureau's designation provides for priority management of L. congesta and P. obcordata at these sites.

The two established ACEC's only protect about 20 percent of these species' limited habitat, about 10 acres for L. congesta and 50 acres for P. obcordata. The Bureau is currently developing a Resource Management Plan with recommendations that two more ACEC's (Ryan Gulch and Duck Creek) be established that include the remaining populations and significant portions of potential habitat as well. Habitat management plans will be developed for these new ACEC's when they are established.

The Bureau also has applied No Surface Occupancy stipulations (NSO) for each ACEC that eliminates surface disturbance to these sites. Generally, the Bureau issues oil and gas leases for a 10-year period. Existing leases may not be modified such as to add NSO's. The Resource Management Plan will recommend that when existing leases expire and come up for reissue, the Bureau will add NSO's to the other known sites for the Dudley Bluff bladderpod and twinpod on Bureau land. Meanwhile, to mine under current leases, a mining company must first provide the Bureau with a development plan. The Bureau then will conduct an environmental analysis of the plan. As part of the procedure for conducting an environmental analysis, the Service is consulted for effects on federally listed species. Therefore, although surface occupancy can take place under existing leases, any disturbance to these plants will be evaluated, minimized, and mitigated.

The Resource Management Plan also will recommend no mineral entry withdrawal for all ACEC's (both present and proposed). Presently, most of the populations are covered under an oil shale withdrawal, which means that only oil shale may be developed. When or if the oil shale withdrawal is rescinded, the areas would be available for withdrawal for other minerals unless such withdrawal is prohibited under the Resource Management Plan.

In the two established ACEC's, off-highway vehicle use is restricted to existing trails and roads. These restrictions will be extended to proposed ACEC's in the Habitat Management Plans developed for the new ACEC's.

A State Natural Area has been established on the Bureau's portion of the Dudley Bluffs site as a cooperative effort between the Bureau and the Colorado Natural Areas Program. The Bureau and the Colorado Natural Areas Program have established one monitoring plot each for both species at Dudley Bluffs; for

the bladderpod in 1988 and for the twinpod in 1985, and another monitoring plot for the twinpod at Yanks Gulch in 1985. These study sites are within the established ACEC's.

The Bee Biology Laboratory of the Agricultural Research Service (under the U.S. Department of Agriculture) has initiated pollination biology studies on both species. Because these species are so isolated and restricted, land uses surrounding populations could impact pollinators important to the reproductive success of the species. Therefore, understanding the pollination biology of these species is especially important. These studies should continue.

The Denver Botanic Garden, as a member of the Center for Plant Conservation, collected seeds of both species for storage in 1987. Seeds also have been germinated at the Garden. Plants of both species are growing in the xeriscape garden and in greenhouse research plots where they are measured for size, phenology, and seed production. Future efforts should include seed collection from all known populations for propagation under controlled conditions to facilitate research on genetic variability, pollination biology, and population biology. The ability to conduct such studies ex situ is important because (1) habitat preservation alone may not be sufficient to preserve the genetic diversity represented by both species, and (2) the habitats of both species are easily degraded by human activity, even activities such as monitoring and other research.

PART II

RECOVERY

Objective and Criteria

The objective of this recovery plan is protection of the L. congesta and P. obcordata populations and habitat. Their removal from the list of endangered and threatened species may not be possible given the species' very small natural populations, limited habitat, and the persistent nature of potential threats. Maintaining these species as threatened on the list of endangered and threatened species will ensure that these species and their habitat will receive the recognition and protection necessary to ensure their long-term survival. The continued existence of both species will be assured when the following conservation criteria are met:

1. Land management designations have been established and habitat management programs developed and implemented that protect and/or enhance all known populations of L. congesta and P. obcordata.

2. Both species are protected from detrimental environmental impacts through fulfillment of informal and formal consultation responsibilities under Section 7 and protection regulations on Federal properties under Section 9 of the Endangered Species Act.

3. Factors required to establish and maintain minimum viable populations of each species have been identified and minimum viable populations are documented as being maintained.

The above objectives and criteria are subject to change as more information becomes available. Since delisting does not seem possible in the foreseeable future, no date can be established for recovery.

All recovery tasks listed below refer to both species.

Step-down Outline

1. Inventory remaining potential habitat.

2. Protect existing habitat.
   - 2.1. Protect habitat on Federal land.
     - 2.1.1. Designate areas of critical environmental concern.
     - 2.1.2. Develop habitat management plans.
     - 2.1.3. Apply No Surface Occupancy stipulations.
     - 2.1.4. Review mining claims.
     - 2.1.5. Establish off-highway vehicle designations.
     - 2.1.6. Process project clearances.

2.2. Protect habitat on private lands.
2.3. Protect habitat on Colorado Division of Wildlife lands.

3. Conduct life history/ecology studies.
3.1. Conduct soil analysis.
3.2. Conduct life history studies.
3.3. Conduct monitoring.

4. Future actions.

Narrative Outline for Recovery Actions Addressing Threats

1. Inventory any remaining potential habitat.

Small, localized, exposed tongues of the shale habitat preferred by both species remain to be surveyed. These sites are difficult to access because permission must be obtained to cross private land or they are located away from existing roads. They may be surveyed best by horseback. Any sites that are identified as being suitable, unoccupied habitat, may be available for future reintroduction. The feasibility and appropriateness of such introductions should be evaluated.

2. Protect existing habitat.

Because of the limited amount of habitat, it is important that it be impacted as little as possible. Various strategies are needed for the different threats and land ownerships.

2.1. Protect habitat on Federal land.

The presence of these plants on Bureau land offers the opportunity for various management strategies through implementation of Federal agency conservation and consultation responsibilities under Section 7 and the protection regulations under Section 9 of the Endangered Species Act. (Section 9 prohibits collection of listed plants and plant materials from Federal properties without proper permit.)

2.1.1. Designate Areas of Critical Environmental Concern.

As indicated above under Conservation Measures, the Bureau has designated two ACEC's for these plants. Because of the limited acreage of habitat occupied by these species, ACEC designation is recommended for the other populations on Bureau land: Ryan Gulch, Yellow Creek, and Duck Creek. This is a Priority One task because habitat protection is essential to the continued existence of the two species.

2.1.2. Develop Habitat Management Plans.

As a means for developing an overall coordinated conservation plan, a Habitat Management Plan should be developed by the Bureau, the Fish and Wildlife Service, and the Colorado Natural Areas Program for each established and proposed ACEC. The habitat management plan should address such issues as no surface occupancy, mineral leasing, off-highway vehicle use, grazing management, vegetation management (such as spraying, chaining, or prescribed burning), and fire suppression activities. The habitat management plan also should outline monitoring needs and responsibilities.

2.1.3. Apply No Surface Occupancy Stipulations.

No Surface Occupancy stipulations for oil and gas leases are important to eliminate surface disturbance to the species habitat. As mentioned above under Conservation Measures, the Bureau has applied NSO stipulations to the designated ACEC's and expressed the intention to apply NSO stipulations to new leases as the existing ones expire. Because leases are issued for a 10-year period, this will be an ongoing process until all existing leases on occupied habitat have expired. NSO stipulations should be applied to new ACEC's when they are established.

2.1.4. Review mining claims.

Plot records need to be checked to determine if current mining claims exist on the plants' habitat. If so, plans for mine development may be required. Because annual maintenance work is required to keep claims current, surface disturbance is a possibility even without actual mining development. If there are no current mining claims on the sites, the area should be considered for mineral withdrawal.

2.1.5. Establish off-highway vehicle designations.

Because of the fragile nature of these species' habitat, off-highway vehicle use can damage it severely. Habitat areas should be designated off-limits to off-highway vehicles through the habitat management plan developed for each ACEC. This is a Priority One task because habitat protection is essential to the continued existence of the species.

2.1.6. Process project clearances.

The Bureau should evaluate proposed projects in the area for potential impact to these plant species. Project sites should be surveyed by a qualified person during the season when the plants are most easily detectable (May and June, typically) in order to document presence or absence of these plants. Measures to protect these species on the project sites should be developed. To comply with the Endangered Species Act, the Bureau must conduct Section 7 consultations for any project that may effect either species.

2.2. Protect habitat on private land.

A portion of the Dudley Bluffs area is private land owned by various energy companies. They have expressed interest in land exchanges with the Bureau in the past. These realty actions should be pursued. The Nature Conservancy could act as a middleman in the process. Alternatively, The Nature Conservancy could negotiate conservation easements with the energy companies.

2.3. Protect habitat on Colorado Division of Wildlife land.

A portion of the Yellow Creek sites of the bladderpod are on Colorado Division of Wildlife land. The Service should develop a cooperative agreement with the Colorado Division of Wildlife for management of the species.

3. Conduct life history/ecology studies.

In order to assess and maintain the full genetic variability inherent in each species and to understand how to establish and maintain minimum viable populations, genetic, population biology, and ecology studies are necessary.

3.1. Soil analysis.

These species appear to be limited to specific geologic strata. Soil analysis would determine soil requirements and/or tolerances. Also, because they grow on erosive badlands in an arid climate, their tolerance to artificial, accelerated rates of erosion and other types of surface disturbance should be investigated.

3.2. Life history studies.

Because other species of these same genera (Lesquerella alpina and Physaria acutifolia) occur nearby on other geologic strata, isolation mechanisms and speciation should be studied. The level of reproductive success as a limiting factor should be assessed through

research on pollination biology, breeding systems, and population genetic structure. When possible, reproductive parameters and habitat conditions governing maintenance of minimum viable populations should be investigated and measured using populations established in ex situ study plots.

3.3. Monitoring.

Permanent monitoring plots already have been established; one for L. congesta and two for P. obcordata. Initial results indicate that annual monitoring may cause undue habitat degradation. Therefore, the objectives, methods, and schedule for monitoring activities should be carefully assessed. Where possible and appropriate, research on management and ecology should take place on populations established in ex situ study plots. Populations should be monitored for reproductive success, tolerance to disturbances of different kinds, and general vigor.

4. Future actions.

If and when oil shale mining development becomes a reality, the Bureau will have the responsibility to conduct Section 7 consultation on development proposals, as required by the Endangered Species Act. This may involve completion of a Biological Assessment. Because habitat is so limited, it should be possible to continue oil shale development while avoiding impacts to these two species. Sponsors of oil shale development should design projects to avoid impacts to these species and their habitats prior to initiation of any Section 7 consultation.

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PART III

IMPLEMENTATION SCHEDULE

The Implementation Schedule that follows outlines actions and estimated costs for the recovery program. It is a guide for meeting the objective discussed in Part II of this Plan. This schedule indicates task priorities, task numbers, task descriptions, duration of tasks, the responsible agencies, and lastly, estimated costs. These actions, when accomplished, should bring about the recovery of the two species and protect their habitats. It should be noted that the estimated monetary needs for all parties involved in recovery are identified and, therefore, Part III reflects the total estimated financial requirements for the recovery of this species.

Priorities in Column one of the following implementation schedule are assigned as follows:

Priority 1: An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.

Priority 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.

Priority 3: All other actions necessary to meet the recovery objective.

Key to Acronyms used in Implementation Schedule

ACEC	Areas of Critical Environmental Concern
BLM	Bureau of Land Management
CDOW	Colorado Division of Wildlife
CNAP	Colorado Natural Areas Program
CPC	Center for Plant Conservation
FWS	Fish and Wildlife Service
HMP	Habitat Management Plan
NSO	No Surface Occupancy
OHV	Off-highway vehicle
SE	Endangered Species Program, U.S. Fish and Wildlife Service
TNC	The Nature Conservancy
USDA	U.S. Dept. of Agriculture Bee Biology Laboratory

PART III - IMPLEMENTATION SCHEDULE
DUDLEY BLUFFS BLADDERPOD/DUDLEY BLUFFS TWINPOD

PRIORITY NUMBER	TASK NUMBER	TASK DESCRIPTION	TASK DURATION (YEARS)	RESPONSIBLE AGENCY FWS REGION	FWS PROGRAM	OTHER	COST ESTIMATES FY-01	FY-02	FY-03	COMMENTS/NOTES
1	211	Establish ACECs	2			BLM	$2000	$2000	---	
1	215	Assign OHV restrictions	2	6	SE		$1000	$1000	---	
						BLM	$2000	$2000	---	
2	212	Develop HMP	2	6	SE		---	$1000	$1000	
						BLM	---	$5000	$5000	
						CNAP	---	$ 500	$ 500	
2	213	Assign NSOs	ongoing			BLM	$2000	$2000	---	
2	216	Conduct project clearances	ongoing	6	SE	BLM	---	---	---	Costs incurred as projects arise
2	22	Protect habitat on private land	6			BLM	---	---	---	Real Estate costs for
						TNC	---	---	---	conservatin easements are not determinable
2	32	Conduct life history studies	4	6	SE		1000	$10000	$10000	
						CPC	---	$4000	$4000	
						TNC	---	$2500	$2500	Partial funding for
						USDA	---	---	---	doctoral student
2	33	Monitor populations	ongoing			BLM	$1000	$1000	$1000	
						CNAP	$1000	$1000	$1000	
2	4	Evaluate future activities	future	6	SE	BLM	**	**	**	**To be determined
3	1	Inventory habitat	2			BLM	---	---	$1000	Depending on source of
						CNAP	---	---	$1000	funding
3	214	Review mining claims	ongoing			BLM	---	$2000	$2000	
3	23	Develop coop agreement with CDOW	2	6	SE		---	---	$1000	
						CDOW	---	---	$2000	
3	31	Conduct soil analysis	1	6	SE		---	---	$3000	***Private
						***	---	---	---	laboratory

This recovery plan was made available to the public for comment as required by the 1988 amendments to the Endangered Species Act of 1973. The public comment period was announced in the Federal Register (57 F.R. 9563) on March 19, 1992 and closed on May 18, 1992. Over 200 press releases were sent to the print media located in Colorado.

During the public comment period, six comment letters were received. The comments provided in these letters have been considered, and incorporated as appropriate. Comments addressing recovery tasks that are the responsibility of an agency other than the U.S. Fish and Wildlife Service have been sent to that agency as required by the 1988 amendments to the Act.