

**Field Survey and
Protection Recommendations for
the Globally Imperiled
Parachute Penstemon,
Penstemon debilis O'Kane and Anderson**



Prepared for
Colorado Natural Areas Program
Denver, Colorado

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Acknowledgments

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The information management staff with the Colorado Natural Heritage Program, especially Alison Loar and Celine Donofrio, was responsible for integrating the data into the Biological Conservation Datasystem and generating the database reports.

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Abstract

Parachute Penstemon (*Penstemon debilis* O'Kane and Anderson) is a candidate for listing on the U.S. Fish and Wildlife Service Endangered Species List, and is known from less than 200 total acres within an approximately 8 x 14 mile range in Garfield County, Colorado. All known occurrences of Parachute Penstemon are potentially threatened by mining for oil shale and/or natural gas development. This report presents the results of our field-oriented research which aimed to update the status of the known occurrences of Parachute Penstemon, identify and search potential habitat for new occurrences of Parachute Penstemon, and expand the knowledge base on this species by recording population and habitat information, as well as by documenting evidence of threats to survival and management needs. We determined twenty-seven survey areas using existing distribution and habitat information, and by reviewing aerial photographs, soil surveys, topographic and geologic maps. We documented two previously unknown occurrences of Parachute Penstemon, bringing the total to four occurrences, and extended the range of this species by about four miles, bringing the total range to 8 x 14 miles. We incorporated survey results with the existing information in the Biological Conservation Datasystem. Analysis of all information resulted in the identification of three conservation sites for Parachute Penstemon. In conclusion, we suggest that stringent conservation actions be taken within the next five years, and that if a protection plan for Parachute Penstemon is not in place within this time, this species should be included on the federal Endangered Species List.

Keywords: Biological Conservation Datasystem; conservation sites; Garfield County, Colorado; Endangered Species List; Parachute Penstemon (*Penstemon debilis*).

Introduction

Parachute Penstemon (*Penstemon debilis* O'Kane and Anderson) is an herbaceous perennial with large purple flowers known from less than 200 total acres within an approximately 8 x 14 mile (112 square miles) range in Garfield County, Colorado. It is among the most rare plants in North America, found only on the Parachute Creek Member of the Green River Formation (O'Kane and Anderson 1987). The Green River Formation contains one of the largest remaining undeveloped sources of fossil fuel in the world (Chronic 1980). Of the oil shale deposits in the Green River Formation, which occurs in Wyoming, Utah, and Colorado, Colorado's oil shale contains the most gallons of oil that can be obtained per ton of shale (Kraushaar and Ristinen 1988). All known occurrences of Parachute Penstemon are potentially threatened by mining for oil shale and/or natural gas development (pers. comm. Carla Scheck 1996). The largest occurrence of Parachute Penstemon is contained in an area recognized as a Colorado State Natural Area (CNAP 1996). Management objectives associated with this designation provide some current protection, though long-term protective mechanisms are not in place. Another small occurrence is located on the Naval Oil Shale Reserve (U.S. Department of Energy) which is managed by the Bureau of Land Management. The remaining locations are privately owned by Occidental Oil, Inc.

Parachute Penstemon is a candidate for listing on the U.S. Fish and Wildlife Service Endangered Species List (USFWS 1996) and is considered "critically imperiled" (G1/S1) by the Colorado Natural Heritage Program (CNHP 1996, Appendix 1) based on its few occurrences, narrow global distribution, and current and potential threats at all of its known locations. The CNHP believes that unless strong protective actions are taken, listing as Threatened by the U.S. Fish and Wildlife Service may be necessary to prevent extinction.

Although extensive rare plant surveys have been conducted on oil shale lands of the Green River Formation (e.g., Harner and Associates 1984, Peterson and Baker 1982, Union Oil Company of California 1984), only two populations of the Parachute Penstemon had been located as of 1995.

The purposes of this study were to: 1) update the status of the known occurrences of Parachute Penstemon, 2) identify and search potential habitat for new occurrences of Parachute Penstemon, and 3) expand the knowledge base on this species by recording population and habitat information, as well as by documenting evidence of threats to survival and management

needs. We also documented similar information for other rare and imperiled plant species as they were encountered during the field component of our research.

The information presented in this report will be integral to a multi-jurisdictional conservation plan for Parachute Penstemon. The Colorado Natural Heritage Program at Colorado State University will invite the Colorado Program of The Nature Conservancy, the Colorado Natural Areas Program, the U.S. Department of Energy, the U.S. Department of Interior (Bureau of Land Management), and oil companies that own land that supports known and/or potential habitat for Parachute Penstemon to participate in this effort.

This research is an integral part of the mission of the Colorado Natural Heritage Program: to collect, analyze, and disseminate information necessary to protect all plants and animals and the water and lands that they need to survive.

Methods

The known locations for Parachute Penstemon (*Penstemon debilis*) share several geographical and ecological features. This species is found on sparsely vegetated, steep decomposing shales (O’Kane and Anderson 1987, Colorado Natural Heritage Program 1996), and occurs in soils classified as Parachute-Irigul-Rhone channery loams immediately above the very steep Rock outcrop-Torriorthents complex (Harman and Murray 1985). The geology of the known locations are nearly identical, occurring just above the Mahogany Zone of the Parachute Creek Member of the Green River Formation (O’Sullivan 1986, Donnell and Yeend 1962).

Colorado Natural Heritage Program and Colorado Natural Areas Program botanists and ecologists conducted field surveys for Parachute Penstemon in northwestern Colorado for 15 days during June and July of 1996. Twenty-seven survey areas, or “targeted inventory areas,” were determined using existing distribution and habitat information, and by reviewing aerial photographs, soil surveys, topographic and geologic maps (Figures 1 and 2). High priority survey sites included those areas which had the same geologic, soils, and vegetation characteristics as the known locations of the Parachute Penstemon. In Colorado, Garfield, Rio Blanco, Mesa, and Delta counties all contain the Green River Formation (Tweto 1979) and were considered in the targeted inventory area analysis. Targeted inventory area selection was not influenced by land ownership patterns. We acquired land ownership information from Union Oil Company of California, Chevron, and from Occidental Oil, Inc. for priority survey areas on private lands. Land owners were contacted in person and by telephone prior to surveys. When we were unable to gain access, we conducted roadside surveys. Surveys were conducted by driving and hiking through each targeted inventory area, inspecting typical habitat as well as unusual edaphic or topographic features.

Plant Species of Special Concern Survey Forms (Appendix 2) were completed for each occurrence of Parachute Penstemon or other plant species of concern. Locations were marked on topographic maps, and photographs were taken of the individual species and their habitats. Taxonomy follows Weber and Wittmann (1996).

Survey results were incorporated with the existing information in the Biological Conservation Datasystem (into the Element Occurrence, Plant Characterization, Element Global Ranking, and Site Basic Record databases) to present a complete picture of the total distribution,

apparent habitat requirements, and threats to Parachute Penstemon and the other globally imperiled plant species encountered during our research.

Analysis of all information resulted in the identification of three conservation sites for Parachute Penstemon. Sites were developed for all locations for Parachute Penstemon. Sites were prioritized for this report according to the overall quality, condition, viability, and defensibility of the specific occurrences of Parachute Penstemon contained within the site. In developing site boundaries, a number of factors were considered, including specific location of rare plant occurrences and surrounding habitat needed to protect significant ecological processes at each site. **The delineation of conservation planning boundaries in this report does not confer any regulatory protection.** The boundaries are solely intended to support wise planning and decision-making for the conservation of imperiled species, especially Parachute Penstemon.

Please note that definitions for all Natural Heritage imperilment ranks are provided in Appendix 1.

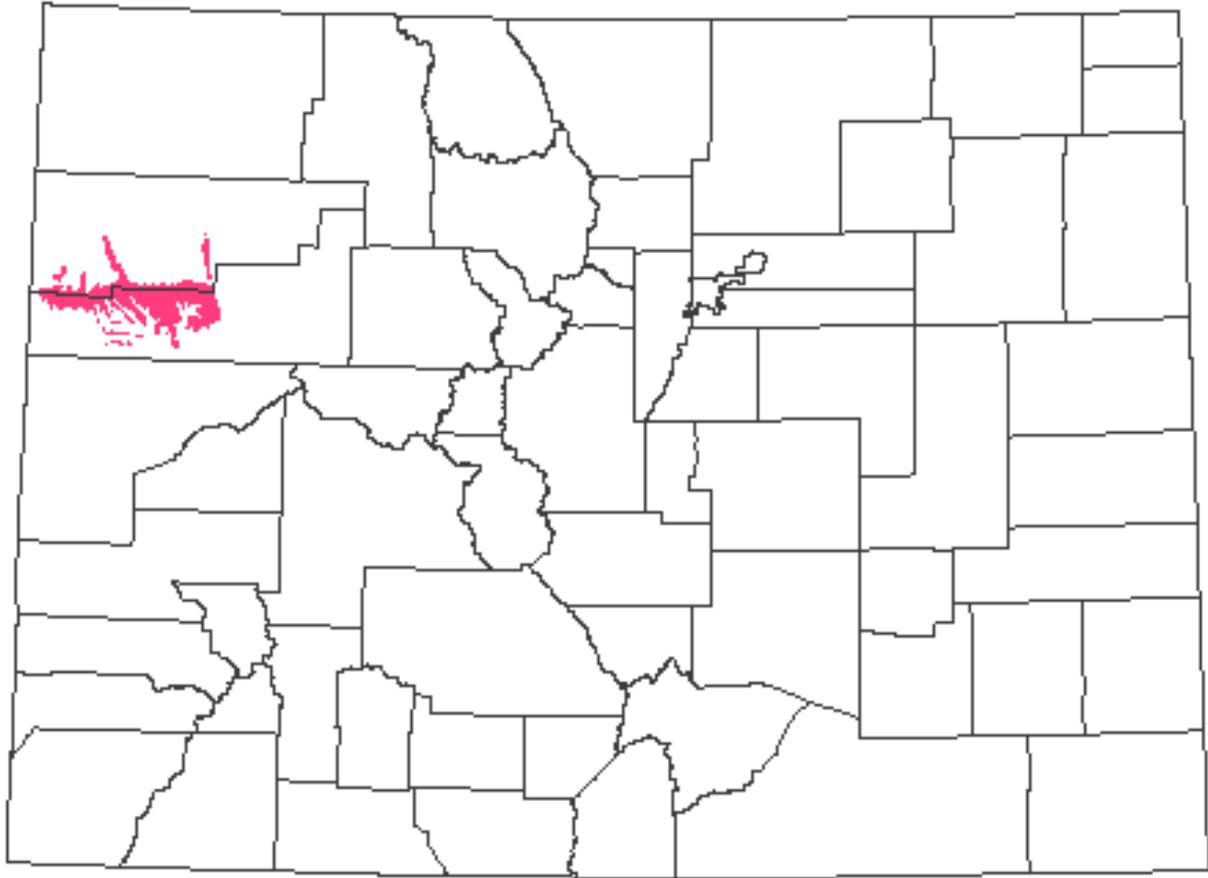


Figure 2b: Total distribution of the Parachute-Irigul-Rhone soil type in Colorado (U.S.D.A., Soil Conservation Service 1994)

Results

Prior to the research documented in this report, Parachute Penstemon (*Penstemon debilis*) was only known from two occurrences, one just below the summit of Mount Callahan, and one on the cliffs east of Anvil Points. Our targeted inventory area analysis identified 27 areas of potential habitat for Parachute Penstemon, including some areas immediately adjacent to known occurrences (Figure 3). Table 1 provides a summary of the level of intensity of the survey conducted at each targeted inventory area, as well as recommendations for future survey needs.

In summary, we documented two previously unknown occurrences of Parachute Penstemon, bringing the total to four occurrences. Our field surveys extended the range of this species by about four miles, bringing the total range to 8 x 14 miles. We recognize two of the occurrences of Parachute Penstemon as falling within one conservation site (Mt. Callahan Site) because of their close proximity and the apparent high quality of the unoccupied habitat between the two occurrences.

During our surveys for Parachute Penstemon we also located four previously undocumented occurrence of Utah Fescue (*Festuca dasyclada*, G3/S3), bringing the total to 55 occurrences; three new occurrences of Wild Hollyhock (*Iliamna grandiflora*, G2Q/S1), bringing the total to seven occurrences; nine new occurrences of Osterhout Penstemon (*Penstemon osterhoutii*, G3Q/S3), bringing the total to nine occurrences; and four new occurrences of Arapien Stickleaf (*Mentzelia argillosa*, G3/S3), bringing the total to 33 occurrences. We revisited four of the 36 previously documented occurrences of Sun-loving Meadowrue (*Thalictrum heliophilum*, G3/S3); four of the 33 previously documented occurrences of Arapien Stickleaf (*Mentzellia argillosa*, G3/S3); and two of the 31 previously documented occurrences of Piceance Bladderpod (*Lesquerella parviflora*, G2G3/S2S3).

For Parachute Penstemon we have included: 1) photographs (Figure 4), 2) a summary of the available natural history information (**plant characterization abstract**), 3) a summary of the overall imperilment (**element global ranking report**), and 4) a map showing the distribution of Parachute Penstemon in Colorado (Figure 5). Similar information for each of the imperiled plant species documented during our research is included in Appendix 3. For Parachute Penstemon, we have also included the complete **element occurrence records** for all known locations.

We recognize the four occurrences of Parachute Penstemon as falling into three distinct conservation sites: the Mount Callahan site, the Anvil Points Rim site, and the Mount Logan

Road site (Figure 6). Of these sites, we recognize the Mount Callahan site as having outstanding significance (B1), and the Anvil Points Rim and the Mount Logan Road sites as being highly significant (B2). Please see Appendix 1 for Natural Heritage Program biodiversity (B) rank definitions.

For each site we have included: 1) photographs taken at the site (Figures 7, 8, 10, and 12), 2) a map of the proposed conservation site boundaries delineated on a 7.5 minute quadrangle (Figures 9, 11, and 13), and 3) a conservation site profile including a written description of the site and a summary of the protection and management concerns. Detailed descriptions of the plants and communities of concern that have been documented within each conservation site (element occurrence records) are available from the Colorado Natural Heritage Program upon request.

Table 1: Targeted Inventory Areas (TIAs) for Parachute Penstemon (*Penstemon debilis*). All TIAs are barren south-facing slopes in areas with the geology mapped as Parachute Creek Member (Tweto 1979) and soils mapped as Parachute-Irigul-Rhone (STATSGO 1996) unless otherwise noted. Intensity of survey during 1996 field season is indicated as follows: high-intensively surveyed, medium- moderate level of survey, low- drive by only. Priority for future inventory is also estimated as high, med, or low based on results of 1996 field survey.

TARGETED INVENTORY AREA	INTENSITY OF SURVEY DURING 1996 FIELD SEASON	PRIORITY FOR FUTURE SURVEYS	COMMENTS
South Cathedral Bluffs	High	Low	
Roan Creek Headwaters	High	Low	
Roan Creek	Low	High	
Kimball Mountain	High	Low	
Cow Ridge	High	Low	
Horse Mountain	High	Low	Not Parachute-Irigul-Rhone soil type.
South Shale Ridge	High	Low	Not Parachute Creek Member geology; not Parachute-Irigul-Rhone soil type.
Mount Blaine	Low	High	
Sleepy Ridge	Low	High	
Long Point	Low	High	
Cascade Canyon	Low	High	
Red Pinnacle	High	Low	
Starkey Gulch	Low	High	
Riley Gulch	Low	High	
Mount Callahan	High	High	Known <i>P. debilis</i> location.
Mount Logan	Low	High	
Mount Logan Road	High	High	N-facing. Known <i>P. debilis</i> location.
Wheeler Gulch	High	Low	
Allen Point	High	Low	
East Fork Parachute Creek	Medium	Medium	

East Middle Fork Parachute Creek	Medium	Medium	
Horsethief Mountain	Low	Low	Not Parachute-Irigul-Rhone soil type; not Parachute Creek Member geology.
Pete and Bill Creek Headwaters	Low	Low	Not Parachute-Irigul-Rhone soil type.
Kimball Creek Headwaters	Low	Low	N-facing, not Parachute-Irigul-Rhone soil type.
Roan Plateau cliffs	High	High	Known <i>P. debilis</i> location.
Anvil Points Road	Medium	Medium	
Sheep Creek	Low	Medium	Incorrect aspect.

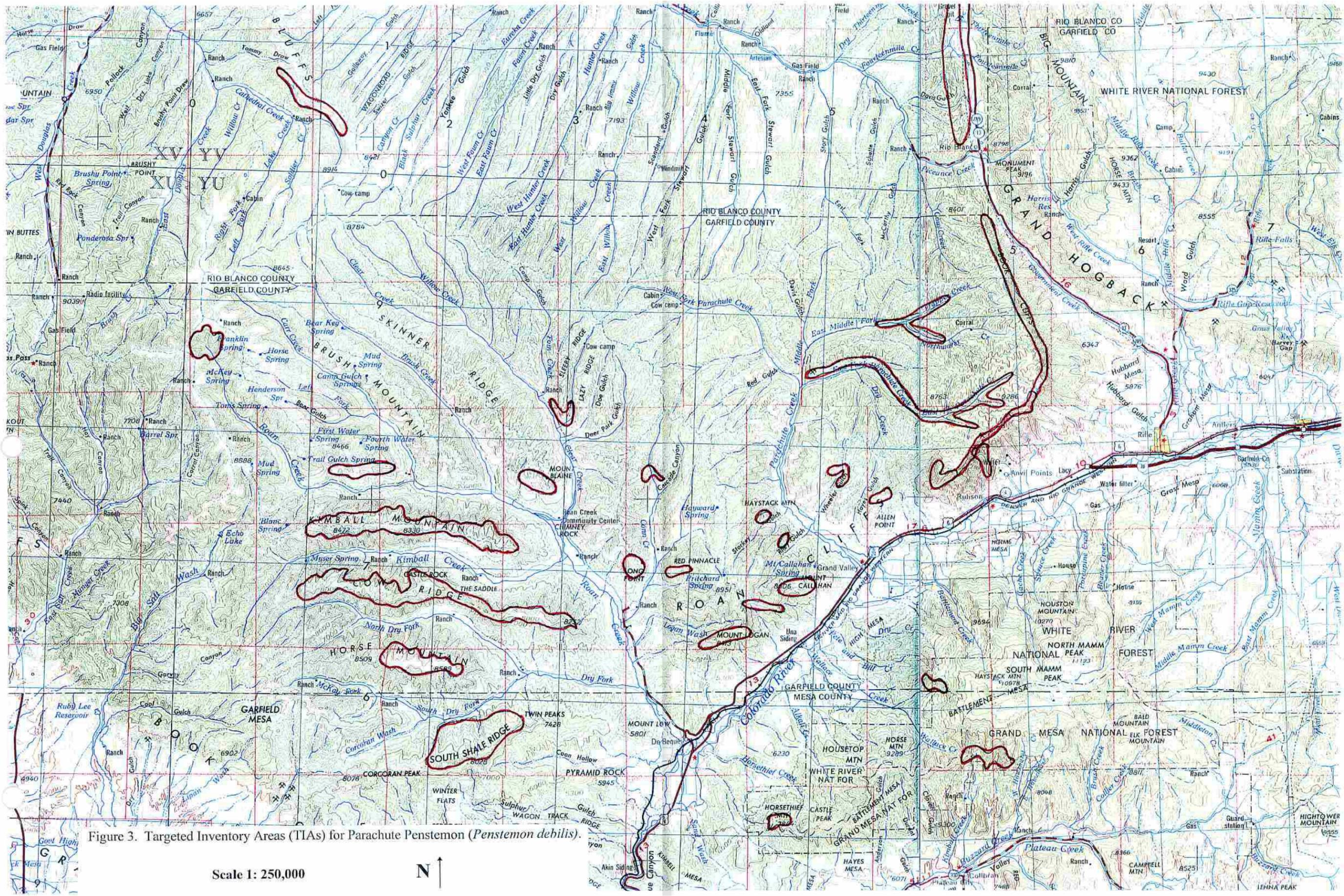


Figure 3. Targeted Inventory Areas (TIAs) for Parachute Penstemon (*Penstemon debilis*).

Scale 1: 250,000





Figure 4. Photographs of Parachute Penstemon (*Penstemon debilis*) and habitat.

by its weak stems, soboliferous habit, succulent, glabrous and glaucous leaves, and its white to pale lavender corollas.

Management:

MANAGEMENT COMMENTS:

Oil shale development is a serious threat for this oil shale endemic and others.

Global Distribution:

Colorado endemic

References:

ABBREVIATED CITATION:

FULL CITATION:

Anderson 1986

Anderson, J. 1986. Plants collected during 1986 by J. Anderson deposited at the University of Colorado Herbarium, Boulder, Colorado.

Anderson 1991

Anderson, J. 1991. *Astragalus osterhoutii* and *Penstemon penlandii* recovery plan. Unpublished report prepared for the US Fish and Wildlife Service, Denver, CO.

Colorado Natural Heritage Program 1996

Colorado Natural Heritage Program. 1996. Biological Conservation Datasystem: Element Occurrence Records.

O'Kane and Anderson 1987

O'Kane, S.L. and J.L. Anderson. 1987. *Penstemon debilis* (Scrophulariaceae): a new species from Colorado endemic to oil shale. *Brittonia* 39(4):412-416.

Scheck 1994

Scheck, C. 1994. Special Status Plants Handbook Glenwood Springs Resource Area. Unpublished report prepared for the Bureau of Land Management, Glenwood Springs, CO.

Element Global Ranking Report

PENSTEMON DEBILIS
PARACHUTE CREEK PENSTEMON

Element Description:

Plant, dicot, Schrophulariaceae, relictual endemic.

Element Occurrence Definition:

Distinct location with more than one individual. Occurrences should be considered new if they are separated from existing occurrences by more than one mile, or if the occurrences are separated markedly by distinct features on the landscape such as ridges, rivers, or roads.

Rank and Reasons:

GLOBAL RANK: G1 RANK DATE: 94-09-13

REASONS: Only 4 occurrences globally; less than 7000 individuals. High threats from potential oil shale development.

Ranking Factors:

ESTIMATED
OCCURRENCES:

4 occurrences in one county. The habitat has been searched extensively.

ABUNDANCE:

6400 individual Penstemon rosettes at Mount Callahan, but the other 3 sites total 350 plants. All four occurrences total 250 acres or less.

SPECIES RANGE:

Narrowly restricted endemic; known from Garfield County; known habitat at least 220 acres (Callahan Ridge site).

TREND:

The Anvil Points site was reported to have 100's of plants (personal communication Betsy Neely 1994). In 1996, however, only 12 plants were counted. The site had been used for recreation (hang-gliding take-off) but it is unknown what effect this use has had on the plants.

PROTECTED
OCCURRENCES:

None protected, all known occurrences are on private land. The largest occurrence is within the Mt Callahan Natural Area, however, it is owned by Occidental Oil Company. A stewardship plan is carried out by Dames and Moore Consulting firm who currently manages the property.

THREATS:

Oil shale development is a serious threat for this oil shale endemic and others; largest documented occurrence is on Occidental Oil Shale, Inc. land.

FRAGILITY:

This species is rare on a fairly widely distributed habitat type. This may suggest a that this species is fairly fragile and vulnerable to some natural threats and human disturbance as well.

OTHER CONSIDERATIONS:

This species occurs on the geologic substrate of the Parachute Creek Member. This rock type is relatively common, compared to the rock type found at Dudley Bluffs for example, and other species associated with the Parachute Creek Member have turned out to be not as rare as originally suspected. However, *P. debilis* seems to be an exception as only four occurrences have been located after fairly extensive survey (pers. comm. John Anderson, Oct. 1994).

Needs:

RESEARCH NEEDS:

Pollination biology. Annual monitoring program should be initiated.

INVENTORY NEEDS:

Extensive searches for *P. debilis* during the summer of 1996 found only two additional occurrences very near the two known occurrences. Soil surveys, and geology maps were used to try to search all suitable habitat (Colorado Natural Heritage Program 1996). Areas requiring further inventory are identified by Spackman et al. (1996).

PROTECTION NEEDS:

Protect all occurrences. Prevent oil shale development at these locations. Should be considered for endangered species list by Fish and Wildlife Service (currently a candidate for listing).

STEWARDSHIP NEEDS:

Prevent all human induced disturbance.

References:

ABBREVIATED CITATION:

FULL CITATION:

Colorado Natural Heritage
Program 1996

Colorado Natural Heritage Program. 1996.
Biological Conservation Datasystem: Element
Occurrence Records.

O'Kane and Anderson 1987

O'Kane, S.L. and J.L. Anderson. 1987. *Penstemon
debilis* (Scrophulariaceae): a new species from
Colorado endemic to oil shale. *Brittonia*
39(4):412-416.

Spackman 1996

Spackman, Susan. 1996. Field survey for
Colorado Natural Heritage Program *Penstemon
debilis* inventory.

Record Maintenance:

GRANKRESP: COHP

EDITION: 94-09-14

UPDATE: 97-02-26

AUTHOR: S. Spackman

Penstemon debilis

Parachute Penstemon

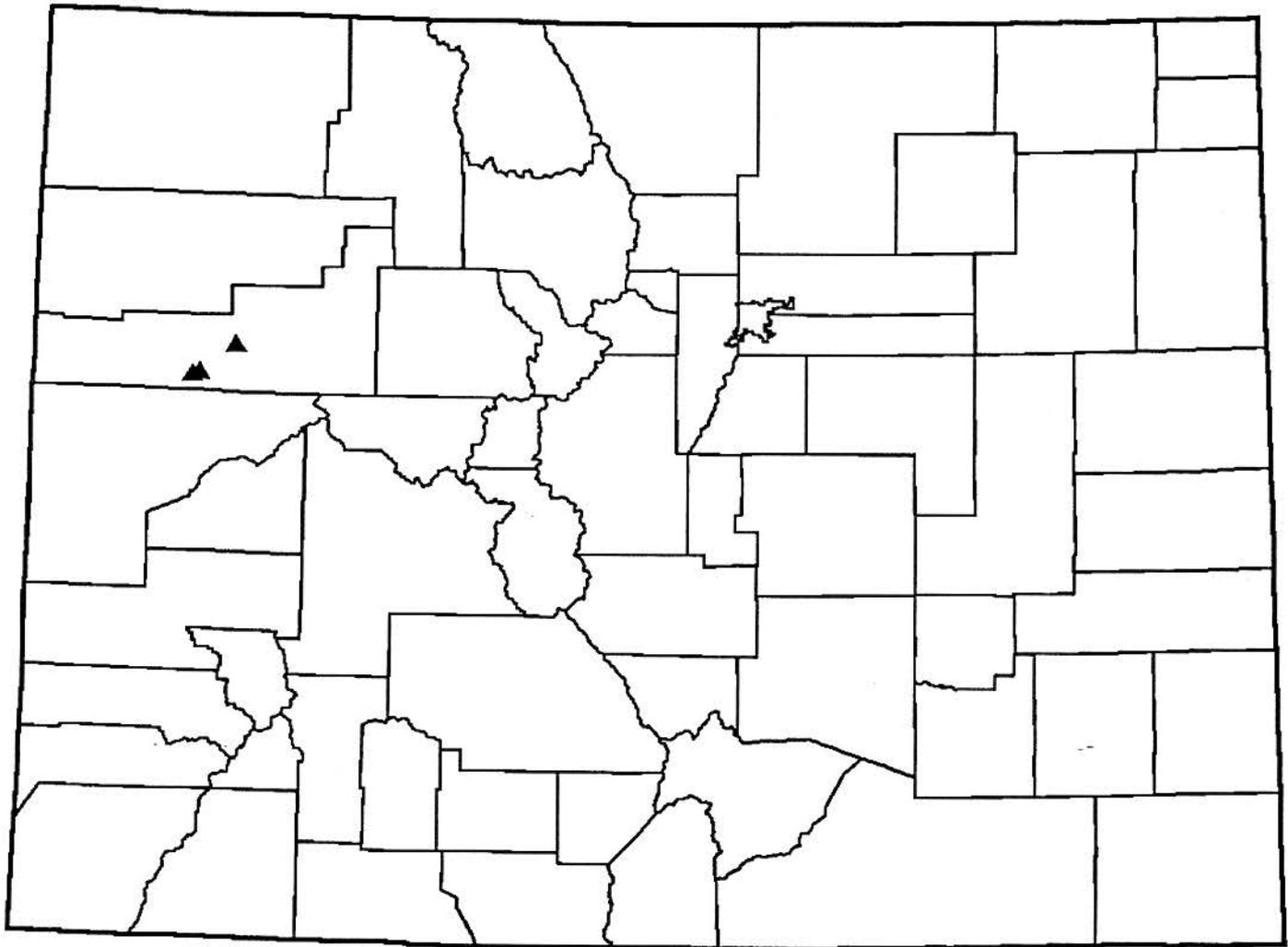


Figure 5.

State Distribution Map – Historical and Extant Occurrences



Figure 6. Parachute Penstemon (*Penstemon debilis*) conservation sites.

Scale 1: 250,000





Figure 7. Photographs taken at Mt. Callahan Site. Parachute Penstemon (*Penstemon debilis*) is found on the steep slopes at the top of the cliffs.



Figure 8. Parachute Penstemon (*Penstemon debilis*) is threatened by mining of oil shale as seen in the center of this photo, taken at the Mt. Callahan Site.

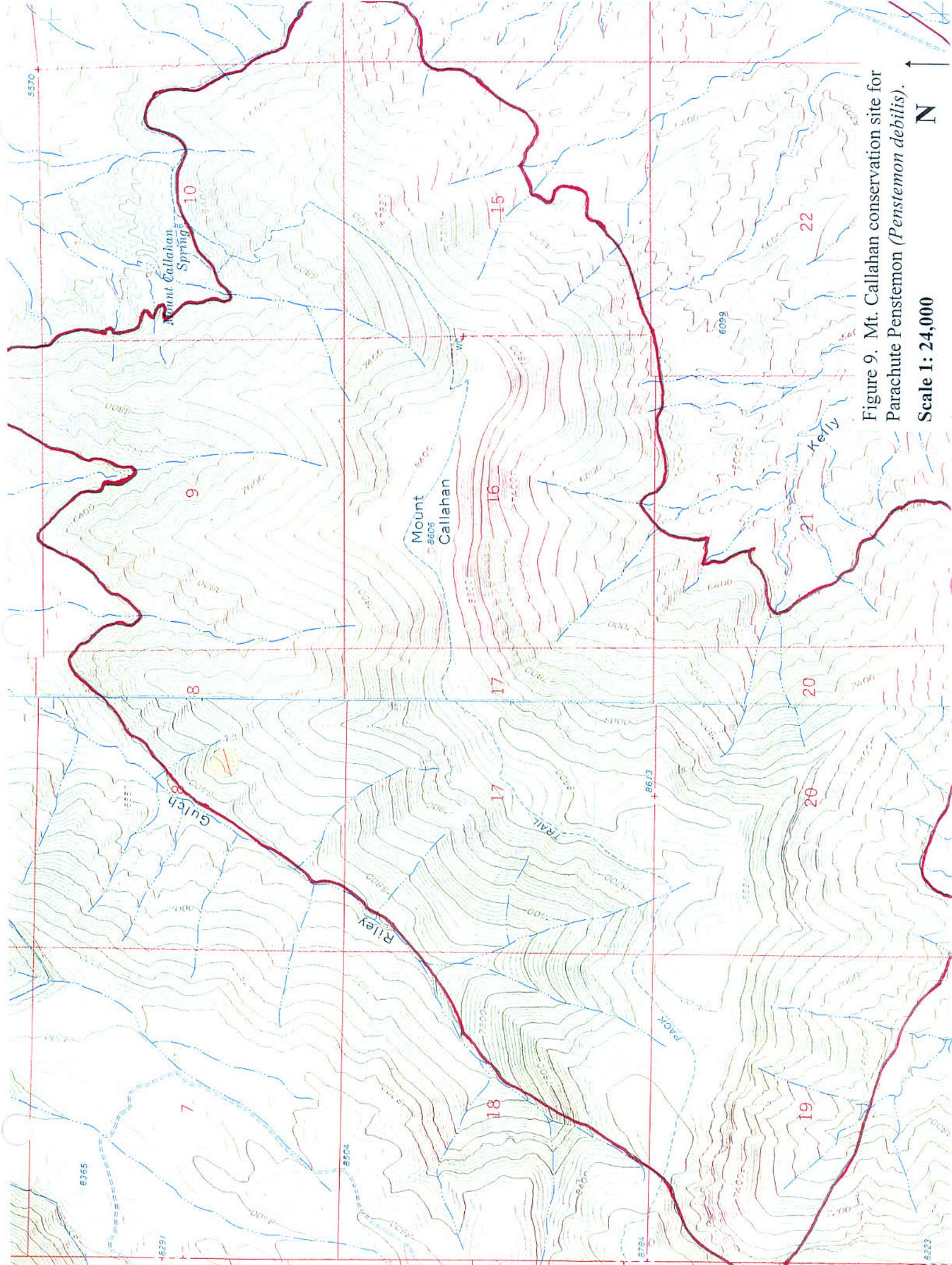


Figure 9. Mt. Callahan conservation site for Parachute Penstemon (*Penstemon debilis*).
Scale 1: 24,000

COLORADO NATURAL HERITAGE PROGRAM
CONSERVATION SITE PROFILE

MOUNT CALLAHAN

BIODIVERSITY SIGNIFICANCE: B1: OUTSTANDING SIGNIFICANCE

PROTECTION URGENCY RATING: P2: THREAT/OPPORTUNITY WITHIN 5 YEARS

MANAGEMENT URGENCY RATING: M3: NEEDED WITHIN FIVE YEARS TO MAINTAIN
QUALITY

LOCATION:

Take the Debeque exit off I70, drive north on Roan Creek Road for 6.6 miles, turn right on Logan Wash Road. Drive 11.1 miles, turn right on road to Mt. Callahan. Drive approximately 2.5 miles to the end of the 2-track.

USGS Quadrangle name(s):
GRAND VALLEY, RED PINNACLE

Townrange and section:
007S096W 9,8,10,11,14,15,16,17,18,19,20,21,22,23,
29

Elevation: 7400 ft. to 8500 ft.

GENERAL DESCRIPTION:

The steep shale exposures on the south-facing slopes and cliffs of Mt. Callahan tower 2500 feet above the Colorado River (I70) about 15 miles downstream of Rifle, Colorado. These shale exposures provide important habitat for five rare plant species, and support the highest quality known occurrences of the critically imperiled Parachute Penstemon. Surrounding the shale exposures, the more gentle slopes support high quality grasslands and sagebrush shrublands. Douglas Fir is found in north-facing ravines and scattered throughout the grassland.

NATURAL HERITAGE RESOURCE SIGNIFICANCE:

The Green River Formation contains some of the largest oil reserves in the United States (Cronquist et al. 1972). This area shows a high rate of endemism in plants. There are five rare plant species which occur on the shale barrens of the Parachute Creek Member of the Green River Formation, including the Dragon Milkvetch (*Astragalus lutosus*) which is watchlisted (G3G4/S3S4). Parachute Penstemon (*Penstemon debilis*), which was recently described in 1986, seems to occur on one outcrop of the Parachute Creek Member, the Mahogany Zone. There are only three known sites for this species in the world. The Mount Callahan site supports two good quality communities which are adjacent to this shale barren rare plant community. All of these elements add to the wide range of biodiversity of Mount Callahan.

		RANK	RANK	STATUS	STATUS	SENS
PINUS EDULIS/CERCOCARPUS MONTANUS	MESIC WESTERN SLOPE PINYON-JUNIPER WOODLANDS	G5	S4			
PSEUDOTSUGA MENZIESII/SYMPHORICARPOS OREOPHILUS	WESTERN SLOPE DOUGLAS FIR FORESTS	G5	S4			
PSEUDOROEGNERIA SPICATA	WESTERN SLOPE GRASSLANDS	G2?	S2?			
MENTZELIA ARGILLOSA	ARAPIEN STICKLEAF	G3	S2			
MENTZELIA ARGILLOSA	ARAPIEN STICKLEAF	G3	S2			
THALICTRUM HELIOPHILUM	SUN-LOVING MEADOWRUE	G3	S3			
PENSTEMON DEBILIS	PARACHUTE PENSTEMON	G1	S1		C	
PENSTEMON DEBILIS	PARACHUTE PENSTEMON	G1	S1		C	
FESTUCA DASYCLADA	UTAH FESCUE	G3	S3			
FESTUCA DASYCLADA	UTAH FESCUE	G3	S3			

PROTECTION AND MANAGEMENT COMMENTS:

This site includes oil shale found in the Green River Formation. Mining of oil shale is a very destructive activity. Large amounts of rock must be processed to produce small amounts of oil. This process takes large quantities of water and also produces large amounts of waste material that must be deposited nearby. Oil shale is not cost effective to extract at this time. Occidental Oil Company (the owner of Mount Callahan) is not currently mining the area. However, the possibility of the renewal of extraction activities could be detrimental to the rare species and high quality communities of Mount Callahan. In order to protect this site the area's natural features must preclude surface disturbance by mining. The State Natural Area boundary should be revised to include both occurrences of Parachute Penstemon. Dames and Moore, the consulting firm responsible for managing the Mount Callahan area for Occidental, should be contacted in early 1997 to discuss the feasibility of natural area boundary revision. Access to this site is restricted and controlled by Dames and Moore.

Grazing should be permitted only with intense management. Element occurrences should be monitored every one to five years to detect changes in size and conditions. Threats should be monitored annually. Need to control the spread of cheatgrass (*Bromus tectorum*) which was noted in 1996 in just a few small patches. Cheatgrass should be pulled before seed set to prevent further infestation.

Work with Occidental Oil Company to assure long term protection.

The area is essentially weed free.

Land uses include grazing and oil shale mining.

BOUNDARY JUSTIFICATION:

This site includes all occurrences on the shale barrens and the occurrences on the adjoining grasslands. A buffer is drawn to protect the element occurrences from indirect and direct disturbances and to encourage the long-term integrity of the various plant communities at the site.

RECOMMENDED FURTHER RESEARCH:

Establish a monitoring program for the rare plant species at this site.

EDITION: 96-11-18



Figure 10. Photograph taken at the Anvil Points Site. Parachute Penstemon (*Penstemon debilis*) is found only on the small barren slope to the right of the road at the top of the cliffs.

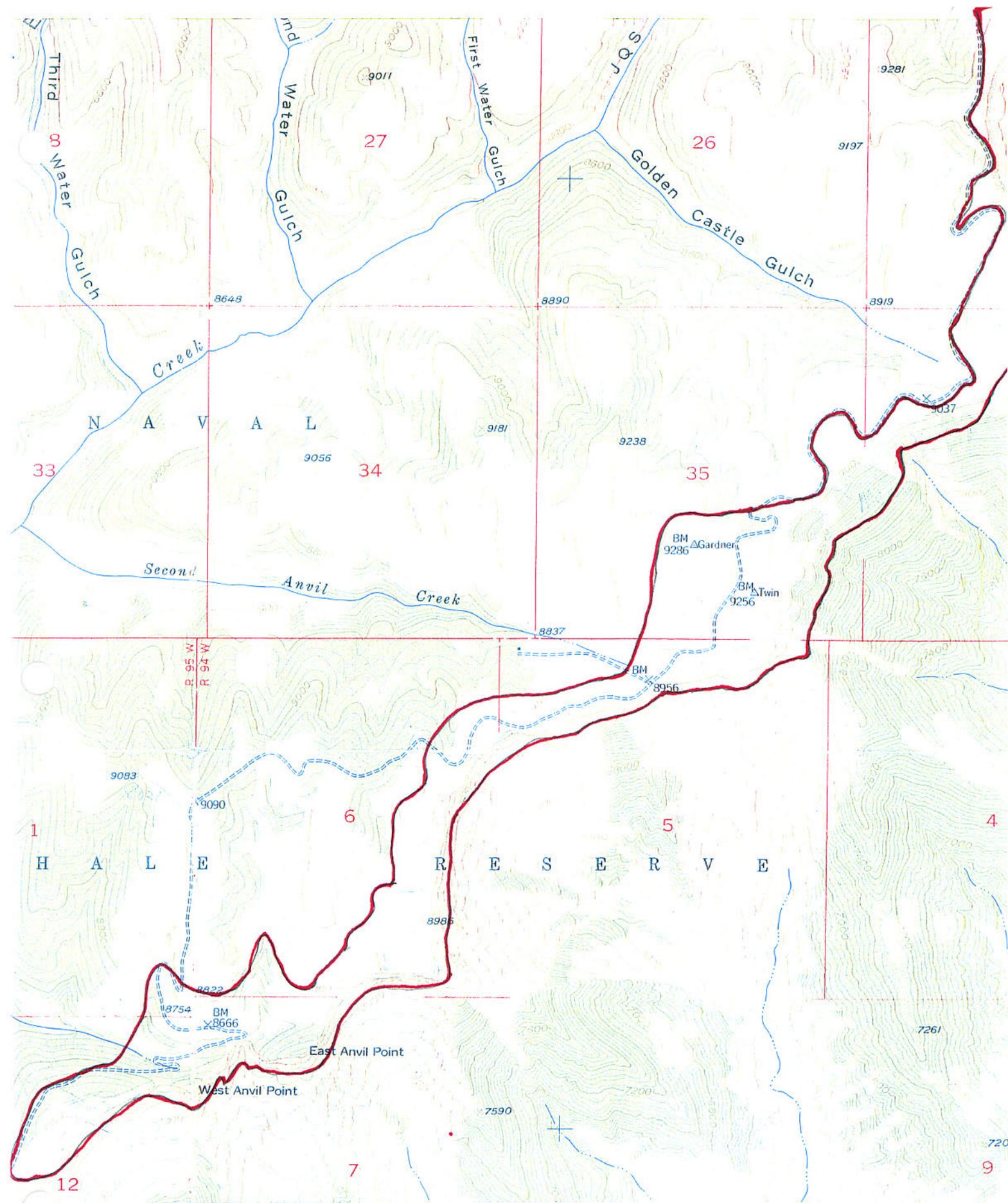


Figure 11. Anvil Points Rim conservation site for Parachute Penstemon (*Penstemon debilis*).

Scale 1: 24,000



RESERVE BOUNDARY

COLORADO NATURAL HERITAGE PROGRAM
CONSERVATION SITE PROFILE

ANVIL POINTS RIM

BIODIVERSITY SIGNIFICANCE: B2: VERY HIGH SIGNIFICANCE

PROTECTION URGENCY RATING: P1: IMMEDIATELY THREATENED/OUTSTANDING
OPPORTUNITY

MANAGEMENT URGENCY RATING: M3: NEEDED WITHIN FIVE YEARS TO MAINTAIN
QUALITY

LOCATION:

Take the Rifle exit from I-70. Head north out of Rifle on Hwy 13. Approximately 5 miles north of town (just past the intersection with Hwy 325), turn west on the JQS trail. Follow this dirt road (which gets narrow and steep) for about 12 miles to the rim above the cliffs. Once atop the plateau, turn back to the left (south) and follow the rim road for about 2 miles to the site. (The JQS Trail should not be traveled during a rainstorm, or very soon thereafter, since the clay substrate makes this exposed road extremely slippery and dangerous.)

USGS Quadrangle name(s):
ANVIL POINTS

Townrange and section:
005S094W 25,35,36
006S094W 5,6,7
006S095W 12

Elevation: 8600 ft. to 9300 ft.

GENERAL DESCRIPTION::

The Anvil Points Rim site is generally the very southeastern limit of the Roan Plateau and the Piceance Basin. The Rim sits at an elevation of about 9000 feet atop some three and half miles of southeast-facing cliffs that plummet 400 feet or more down toward the Colorado River, 4000 feet below. These dramatic cliffs are home to nesting Peregrine Falcons and Golden Eagles. The rim above the cliffs is a mixture of *Artemisia tridentata* *vaseyana* and *Symphoricarpos rotundifolius* with scattered Blue bunch wheatgrass grassland (*Pseudoroegneria spicata* *inermis*) - dominated hilltops. On a small patch of south-facing shale scree, the globally rare oil-shale endemic *Penstemon debilis* can be found. This occurrence of *Penstemon debilis* is one of four known sites in the world.

NATURAL HERITAGE RESOURCE SIGNIFICANCE::

C-ranked occurrence of globally rare (G1) Parachute penstemon, A-ranked occurrence of federally endangered Peregrine Falcon, B-ranked occurrence of globally rare (G2) Arapien stickleaf (*Mentzelia argillosa*), B-ranked occurrence globally rare (G2) western slope Great Basin grassland community

(*Pseudoroegneria spicata inermis*), A-ranked occurrence of statewide rare (S2) Columbian Sharp-tailed Grouse, and an important butterfly lek for *Papilio bairdii* and *Callophrys affinis*. The sagebrush/snowberry shrublands along the rim are also home to the statewide rare (S3) Merriam's shrew.

SCIENTIFIC NAME:	COMMON NAME:	GLOBAL STATE		FEDERAL	STATE	FOREST
		RANK	RANK	STATUS	STATUS	SENS
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G4T4	S2B,SZ	LE	T	
TYMPANUCHUS PHASIANELLUS COLUMBIANUS	COLUMBIAN SHARP-TAILED GROUSE	G5T3	S2			FS
POPULUS TREMULOIDES/ACER GLABRUM	MONTANE RIPARIAN FORESTS	G2	S1S2			
POPULUS TREMULOIDES/TALL FORBS	MONTANE ASPEN FOREST	G5	S5			
PSEUDOROEGNERIA SPICATA-POA SECUNDA	MONTANE GRASSLANDS	G4	S1			
PSEUDOROEGNERIA SPICATA	WESTERN SLOPE GRASSLANDS	G2?	S2?			
LEYMUS CINEREUS	WESTERN SLOPE GRASSLANDS	G4	S1S2			
MENTZELIA ARGILLOSA	ARAPIEN STICKLEAF	G3	S2			
ILLIAMNA GRANDIFLORA		G1Q	SU			
PENSTEMON DEBILIS	PARACHUTE PENSTEMON	G1	S1	C		
FESTUCA DASYCLADA	UTAH FESCUE	G3	S3			
FESTUCA DASYCLADA	UTAH FESCUE	G3	S3			

PROTECTION AND MANAGEMENT COMMENTS:

The land is currently owned by the Department of Energy (DOE), but they are considering giving up the land within the next few years. So long as the land remains in public hands, protection urgency is slight. The potential for oil and gas development exists, but at this time does not appear to be a viable option for DOE. There is no current special designation given the site. If DOE opts to transfer the land to BLM, the site should be recommended for designation as an ACEC. If DOE opts to keep the land, it should be considered as an area of special concern. If DOE opts to sell the land outright to the highest-bidding private interest, protection urgency would be far greater, as oil and gas development would surely become the primary use of the land. At least one study, that was conducted for DOE in 1996, suggests selling the land outright. In any case, DOE will most likely give up the property within the next year.

The current management regime is adequate, but must continue over the years to come in order to help ensure the persistence of the integrity of the site. There was some initial concern for protection of the penstemon population earlier this season stemming from the will of a para-glider club from Aspen, CO; the club members had chosen the very site where the penstemon lives as a launching point for their sport. This problem has been semi-solved with the construction of a fence around the site to discourage trampling. Cattle and sheep grazing remain the primary land-use activity on the site. A grazing management plan should incorporate a separate, special management plan for this critical site: Grazing should remain light and no water enhancement projects should occur within this site. The current road plan for NOSR-1 is minimal, and as of now, anyone can drive off-road (ie: make new roads). The grassland is extremely convenient for off-road drivers, as evidenced by the number of extraneous roads that already exist. Any unnecessary roads should be closed and road travel should be limited to primary roads. Roads are the most common vector for the introduction of exotic plant species that would only degrade this site.

The general level of protection for the Anvil Points Rim site is anchored by the fact that it occurs on withheld public lands. Though there are no

current plans for oil and gas development, the potential exists.

There are supposedly some released Barbary sheep in the vicinity of the site, but we never encountered them, nor any signs of their existence. The Colorado Division of Wildlife periodically makes helicopter flights over the area in attempts to shoot any Barbary sheep they encounter, and there is an ever-open hunting season on them in the area.

The issue of potentially threatening land-use by the para-gliding club has been circumvented for a time. The Anvil Points Rim site is currently being used for livestock grazing, but the rim itself is only slightly used due to scarcity of water. There are two recently constructed stock tanks within the boundaries of the site, but they were dry by the end of the season this year, and were located in the very heads of ephemeral streams. A substantially-sized road bisects the entire site, and a few peripheral roads exist. The area experiences heavy use during all hunting seasons, but the critical areas do not appear to be choice sites for hunter camping.

BOUNDARY JUSTIFICATION:

The boundary includes the majority of the southeast rim of the Roan Plateau. This area includes all known occurrences in the vicinity and a reasonable buffer to protect them from direct disturbance.

RECOMMENDED FURTHER RESEARCH:

Still need information on the status of the site as a lekking ground for Columbian Sharp-tailed Grouse.

EDITION: 96-10-28



Figure 12. Photograph taken at the Mt. Logan Road Site. A few individuals of Parachute Penstemon (*Penstemon debilis*) were found along this road, nearly 2 miles from any other known occurrence. This site differs from the other Parachute Penstemon locations in that it is north-facing.

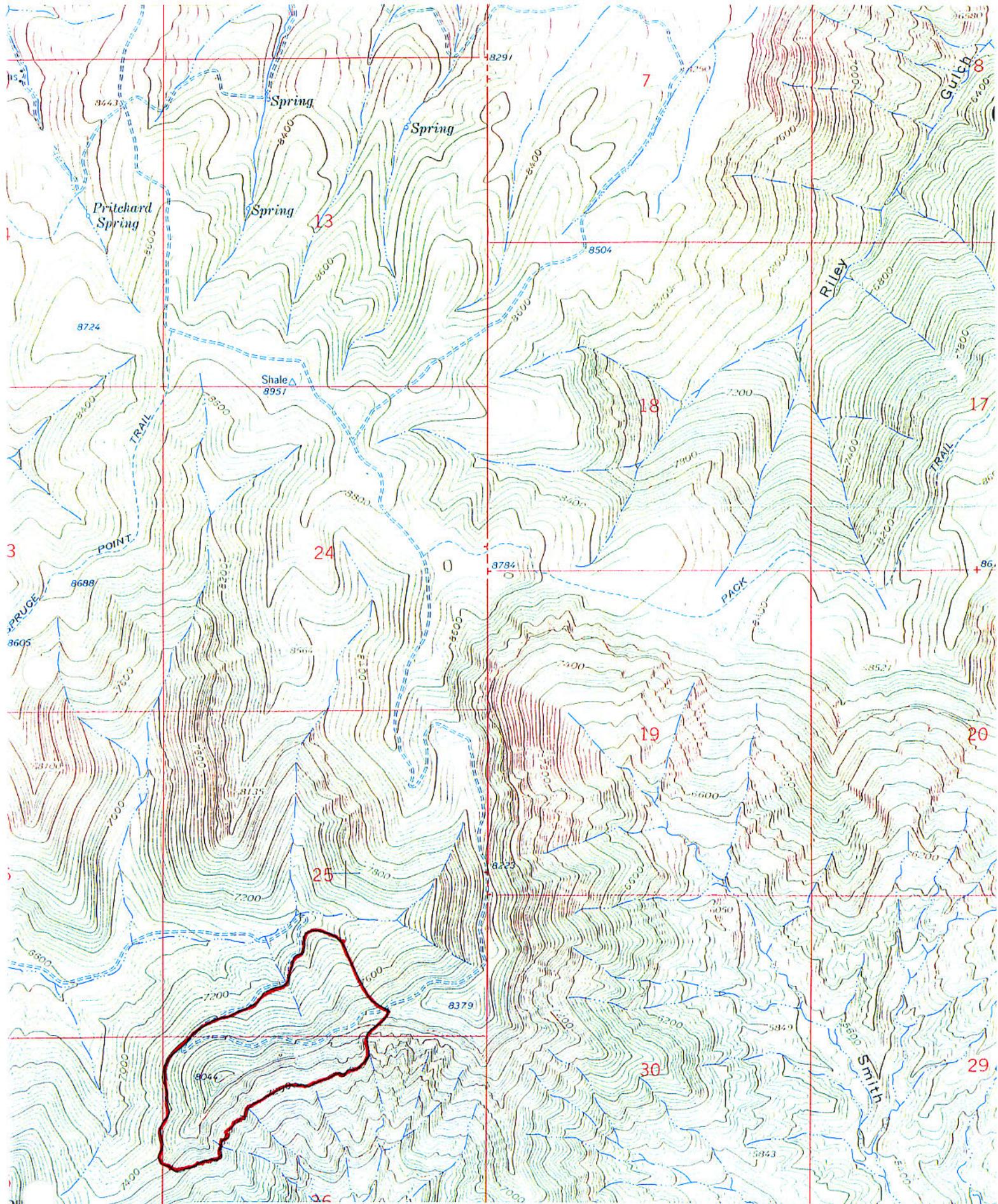


Figure 13. Mt. Logan Road conservation site for Parachute Penstemon (*Penstemon debilis*).

Scale 1: 24,000



COLORADO NATURAL HERITAGE PROGRAM
CONSERVATION SITE PROFILE

MT LOGAN ROAD

BIODIVERSITY SIGNIFICANCE: B1: OUTSTANDING SIGNIFICANCE
PROTECTION URGENCY RATING: P2: THREAT/OPPORTUNITY WITHIN 5 YEARS
MANAGEMENT URGENCY RATING: M2: ESSENTIAL WITHIN FIVE YEARS TO
PREVENT LOSS

LOCATION:

Take the Debeque exit off I70, drive north on Roan Creek Road for 6.6 miles, turn right on Logan Wash Road. Drive up onto the switchbacks on Mt. Logan.

USGS Quadrangle name(s):
RED PINNACLE

Townrange and section:
007S097W 25,36

Elevation: 7800 ft. to 7800 ft.

GENERAL DESCRIPTION: :

This site includes the roadside of a narrow dirt road which switchbacks up Mt. Logan. The roadcut exposes Green River shale which supports the rare plants in an unnatural setting. Dense vegetation surrounds the roadcut on this north-facing slope which would normally cover the shale.

NATURAL HERITAGE RESOURCE SIGNIFICANCE: :

The site includes a C ranked occurrence of *Penstemon debilis* (G1S1) plant species, an A ranked occurrence of *Ceanothus martinii* (G4S1), a C ranked occurrence of *Mentzelia argillosa* (G2S2) unranked occurrence of *Festuca dasyclada* (G3S3).

SCIENTIFIC NAME:	COMMON NAME:	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS	FOREST SENS
MENTZELIA ARGILLOSA	ARAPIEN STICKLEAF	G2?	S2			
CEANOTHUS MARTINII	UTAH MOUNTAIN LILAC	G4	S1			
PENSTEMON DEBILIS	PARACHUTE PENSTEMON	G1	S1	C		
FESTUCA DASYCLADA	UTAH FESCUE	G3	S3			

PROTECTION AND MANAGEMENT COMMENTS:

Privately owned by Occidental Oil Company. The roadcut which supports the rare plants is infrequently used but protection for the plants is

necessary.

Oil shale mining operations and the associated road traffic threaten this site. A management agreement should be reached with Occidental Oil Company.

Bromus enermis is on the roadside.

Road traffic.

BOUNDARY JUSTIFICATION:

The site includes occurrences of 4 rare plant species on a roadcut and a small buffer up and downslope of the road.

RECOMMENDED FURTHER RESEARCH:

EDITION: 96-11-20

Discussion and Recommendations

Despite extensive botanical research in the Piceance Basin of Colorado in the early 1980s (Peterson and Baker 1982, Harner and Associates 1984, Union Oil Company of California 1984), Parachute Penstemon (*Penstemon debilis*) was not discovered until 1986. The results of intensive field surveys in 1996 (including this project and Rondeau *et al.* 1997) indicate that Parachute Penstemon is only known from four occurrences in an area approximately 8 x 14 miles in size near the center of Garfield County, Colorado. We recognize that further inventories are necessary to assure a complete understanding of the total distribution of this species (please see Table 1). However, based on the results of our research, we feel it is unlikely that many new occurrences of Parachute Penstemon will be located.

The habitat for Parachute Penstemon contains fossil fuels and is threatened by development. The two occurrences in the Mount Callahan site are separated by only two miles. Both are in excellent condition. The other two occurrences, at the Anvil Points Rim and Mount Logan Road sites, are very small and may be more vulnerable to extirpation caused by stochastic events or other factors. Herbivory was noted at all sites which may be causing additional stresses to this critically imperiled species.

We recommend that strong conservation actions be taken to provide for the long-term protection of Parachute Penstemon at all three sites, in the following order of priority: 1) Mount Callahan site, 2) Anvil Points Rim site, and 3) Mount Logan Road site. This order reflects our best estimate of the sites potential for long-term viability within the context of a naturally functioning ecosystem.

We recognize the possibility that Parachute Penstemon may be “naturally” headed for extinction. This hypothesis gives significance to Parachute Penstemon in terms of its research value. This is a species that could uncover clues to questions regarding extinction processes and other questions important to the field of conservation biology. In the event that Parachute Penstemon may be declining, and because this species is vulnerable simply because of its narrow distribution, we recommend that seeds be collected and stored at the National Seed Storage Lab at Colorado State University and the Missouri Botanical Garden Center for Plant Conservation.

A team of biologists and land managers should be formed to determine and follow through with specific protective actions for each occurrence of Parachute Penstemon. Conservation actions should include the establishment of a long-term monitoring program

designed to detect changes in population size, structure, and overall condition of each occurrence. A monitoring program should be designed in a way that assures that the occurrences are not negatively impacted by the research methods. This team should also develop a strategy for monitoring the threats to each occurrence, especially fossil fuel developments but also potential increases in recreational or other land uses, and prepare a plan for listing by the Endangered Species Act should that become necessary. Information about the basic biology (for example, pollination and seed dispersal mechanisms, seed germination requirements, and edaphic adaptations) would improve our ability to manage for the long-term protection of Parachute Penstemon.

In conclusion, we suggest that stringent conservation actions be taken within the next five years. If a protection plan for Parachute Penstemon is not in place within this time, we suggest listing this species on the federal Endangered Species List (USFWS 1996).

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Appendix One

NATURAL HERITAGE METHODOLOGY

Overview

The Natural Heritage Methodology operates at several different levels. First, **elements of natural diversity** are ranked according to their rarity and/or degree of imperilment. These **elements** consist of rare or imperiled species, subspecies and significant natural communities. The relative rarity of the various elements is based upon the scientific biological information and population locations known currently. As new information is acquired, element ranks can be modified.

The second level of the Natural Heritage Methodology is the ranking of the populations or **occurrences** of a particular element. Since it is frequently impossible to protect all populations of a particular species, subspecies, or natural community, attempts are made to evaluate the relative quality of various occurrences of these elements so that conservation efforts can be focused on the best representatives of the elements and the healthiest, most viable populations.

The third level of the Natural Heritage Methodology is the delineation of potential conservation sites and the ranking of these sites. This ranking is based on the rarity and quality of the element occurrences contained within the sites. This enables conservation efforts to focus on assemblages of rare elements as well as on the elements themselves. A comprehensive, scientific approach to protecting species results when these three levels of Natural Heritage Methodology are applied.

Element Ranking

CNHP uses an element ranking system emphasizing the number of occurrences at distinct localities as an index of known biological rarity. The primary criterion for ranking elements is the number of occurrences because an element found in one place is more imperiled than an element found in twenty places. Also of importance is the size of the geographic range, the number of individuals, trends in both population and distribution, identifiable threats, and the number of already protected occurrences. Each element is assigned a rank that indicates its relative degree of imperilment on a five point scale:

- 1 = critically imperiled because of extreme rarity; five or fewer occurrences;
- 2 = imperiled because of rarity; 6 to 20 occurrences;
- 3 = very rare or vulnerable; generally found in a restricted range; 21-100 occurrences;
- 4 = apparently secure but may be declining; and
- 5 = demonstrably secure.

Element imperilment ranks are assigned in terms of imperilment within Colorado, the state rank, and the element's imperilment over its entire range, the global rank. The

global rank, or G-rank, sets the overall priorities. The state rank, or S-rank, is used in discerning local, regional, and state priorities. For example, an element with a rank of G3/S2 will receive higher priority than an element with a rank of G5/S1 due to its global rank. Together these two ranks provide an instant picture of an element's degree of imperilment or rarity. It should be noted that an element can never be more common within a state than it is globally. Therefore, the element's S-rank will always be as rare as the global ranking, i.e., G3/S2 not G2/S3.

Elements that receive a rank of S1, S2 and S3 are used to set species protection priorities. Elements with a ranking of S3S4 are "watchlisted"; data is collected and periodically analyzed to determine if more active tracking is warranted. Any element more common than a "watchlisted" element, with an S-rank of S4 or S5, is not monitored. Accepted subspecies are also included on the CNHP list (with associated trinomial ranks, or T-ranks), but they receive less priority than an equivalently ranked or imperiled species.

This single ranking system identifies all imperiled elements except those that are migratory. When ranking migratory elements it is necessary to distinguish between breeding, non-breeding, and resident species. A rank followed by a "B", e.g., S1B, indicates that the rank applies only to the status of breeding occurrences. Ranking followed by an "N", e.g., S1N, refers to non-breeding status, typically during migration and winter. Elements without this notation are believed to be year-round residents within the state. A complete description of each of the Natural Heritage global and state ranks is provided in the following tables.

Definition of Natural Heritage Global Rarity Ranks.

Global Rank (G): Based on the range-wide status of a species.

- G1 Critically imperiled globally because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extinction. (Critically endangered throughout its range).
- G2 Imperiled globally because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extinction throughout its range. (Endangered throughout its range).
- G3 Vulnerable throughout its range or found locally in a restricted range (21 to 100 occurrences).
- G4 Apparently secure globally, though it might be quite rare in parts of its range, especially at the periphery.
- G5 Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
- GX Presumed extinct.
- G#? Indicates uncertainty about an assigned global rank.
- GU Unable to assign rank due to lack of available information.
- GQ Indicates uncertainty about taxonomic status.
- G#T# Trinomial rank (T) is used for subspecies or varieties. These taxa are ranked on the same criteria as G1-G5.
-

Definitions of Natural Heritage State Rarity Ranks.

State rank (S): Based on the status of a species in an individual state. S ranks may differ between states based on the relative abundance of a species in each state.

- S1 Critically imperiled in state because of extreme rarity (5 or fewer occurrences, or very few remaining individuals), or because of some factor of its biology making it especially vulnerable to extirpation from the state. (Critically endangered in state).
- S2 Imperiled in state because of rarity (6 to 20 occurrences), or because of other factors demonstrably making it very vulnerable to extirpation from the state. (Endangered or threatened in state).
- S3 Vulnerable in state (21 to 100 occurrences).
- S#B Refers to the breeding season imperilment of elements that are not permanent residents.
- S#N Refers to the non-breeding season imperilment of elements that are not permanent residents. Where no consistent location can be discerned for migrants or non-breeding populations, a rank of SZN is used.
- SZ Migrant whose occurrences are too irregular, transitory, and/or dispersed to be reliably identified, mapped, and protected.
- SH Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.
- SX Presumed extirpated from state.
- S#? Indicates uncertainty about an assigned state rank.
- SU Unable to assign rarity rank, often because of low search effort or cryptic nature of the element.
- SA Accidental in the state.
- SR Reported to occur in the state, but unverified.
- S? Unranked; some evidence that species may be imperiled, but awaiting formal rarity ranking.
-

Legal Designations

Natural Heritage rarity ranks should not be interpreted as legal designations. Although most species protected under state or federal endangered species laws are extremely rare, not all rare species receive legal protection. Legal status is designated by either the U.S. Fish and Wildlife Service under the Endangered Species Act or by the Colorado Division of Wildlife under Colorado Statutes 33-2-105 Article 2. In addition, the U.S. Forest Service recognizes some species as "Sensitive," as does the Bureau of Land Management. The following table defines the special status assigned by these agencies and provides a key to the abbreviations used by CNHP.

Federal and State Agency Designations.

Federal Status:

1. U.S. Fish and Wildlife Service (58 Federal Register 51147, 1993)

LE Endangered; taxa formally listed as endangered.

LT Threatened; taxa formally listed as threatened.

P Proposed E or T; taxa formally proposed for listing as endangered or threatened.

C Candidate: taxa for which the Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.

2. U.S. Forest Service (Forest Service Manual 2670.5) (noted by the Forest Service as "S")

FS: Sensitive: those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:

 a. Significant current or predicted downward trends in population numbers or density.

 b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

3. Bureau of Land Management (BLM Manual 6840.06D) (noted by BLM as "S")

BLM: Sensitive: those species found on public lands, designated by a State Director, that could easily become endangered or extinct in a state. The protection provided for sensitive species is the same as that provided for C (candidate) species.

Element Occurrence Ranking

Actual locations of elements, whether they be single organisms, populations, or communities, are referred to as element occurrences. The element occurrence is considered the most fundamental unit of conservation interest and is at the heart of the Natural Heritage Methodology. In order to prioritize element occurrences for a given species, an element occurrence rank (EO-Rank) is assigned according to their ecological quality whenever sufficient information is available. This ranking system is designed to indicate which occurrences are the healthiest and ecologically the most viable, thus focusing conservation efforts where they will can be most successful. The EO-Rank is based on 4 factors:

Quality -- the representativeness of the occurrence as compared to element occurrence (EO) specifications including maturity, size, and numbers. The element occurrence specifications are set by a consensus of experts regarding the element in question;

Condition -- how much has the site and EO been damaged or altered from its optimal condition and character;

Viability -- the long term prospects for continued existence of this occurrence;

Defensibility -- the extent to which the occurrence can be protected from extrinsic human factors that might otherwise degrade or destroy it.

Each of these factors are rated on a scale of A through D, with A representing an excellent grade and D representing a poor grade. These grades are then averaged to determine an appropriate EO-Rank for the occurrence. Possible EO-Ranks and their appropriate definitions are as follows:

- A -- Excellent
- B -- Good
- C -- Fair
- D -- Poor
- E -- Verified extant but has not been given an EO-Rank
- O -- Obscure, not found at the site reported from but not thoroughly searched for; more searching needed.
- X -- Extirpated from the site, not located by repeated reasonably intensive field searches by qualified field people at the right time of year, or habitat is significantly altered and no longer suitable for maintenance of the element.
- H -- Historical, no recent field information.

If there is insufficient information available to rank an element occurrence, an EO-Rank is not assigned.

Conservation Sites

In order to successfully protect populations or occurrences, it is necessary to delineate conservation sites. These conservation sites focus on capturing the ecological processes that are necessary to support the continued existence of a particular element of natural heritage significance. Conservation sites may include a single occurrence of a rare element or a suite of rare elements or significant features.

The goal of the process is to identify a land area that can provide the habitat and ecological processes upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses. The proposed boundary does not automatically exclude all activity. It is a hypothesis that some activities will prove degrading to the element or the process on which they depend, while others will not. Consideration of specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based.

Preliminary Conservation Planning Boundaries

Once the presence of rare or imperiled species or significant natural communities has been confirmed, the first step towards its protection is the delineation of a preliminary conservation planning boundary. In general, the preliminary conservation planning boundary is an estimate of the landscape that supports the rare elements as well as the ecological processes that allow them to persist. In developing such boundaries, CNHP staff considered a number of factors that include, but are not limited to:

- the extent of current and potential habitat for the elements present, considering the ecological processes necessary to maintain or improve existing conditions;
- species movement and migration corridors;
- maintenance of surface water quality within the site and the surrounding watershed;
- maintenance of the hydrologic integrity of the groundwater, e.g., by protecting recharge zones;
- land intended to buffer the site against future changes in the use of surrounding lands;
- exclusion or control of invasive exotic species;
- land necessary for management or monitoring activities.

As the label "conservation planning" indicates, the boundaries presented here are for planning purposes. They delineate ecologically sensitive areas where land-use practices should be carefully planned and managed to ensure that they are compatible with protection goals for natural heritage resources and sensitive species. All land within the conservation planning boundary should be considered an integral part of a complex economic, social, and ecological landscape that requires wise land-use planning at all levels.

Off-Site Considerations

Furthermore, it is often the case that all relevant ecological processes cannot be contained within a site of reasonable size. Taken to the extreme, the threat of ozone depletion could expand every site to include the whole globe. The boundaries illustrated in this report signify the immediate, and therefore most important, area in need of protection. Continued landscape level conservation efforts are needed. This will involve county-wide efforts as well as coordination and cooperation with private landowners, neighboring land planners, and state and federal agencies.

Ranking of Conservation Sites

One of the strongest ways that the CNHP uses these element and element occurrence ranks is to assess the overall biodiversity significance of a site, which may include one or many element occurrences. Based on these ranks, each site is assigned a **biodiversity (or B-) rank**:

B1 Outstanding Significance: only site known for an element or an excellent occurrence of a G1 species.

B2 Very High Significance: one of the best examples of a community type, good occurrence of a G1 species, or excellent occurrence of a G2 or G3 species.

B3 High Significance: excellent example of any community type, good occurrence of a G3 species, or a large concentration of good occurrences of state rare species.

B4 Moderate or Regional Significance: good example of a community type, excellent or good occurrence of state-rare species.

B5 General or Local Biodiversity Significance: good or marginal occurrence of a community type, S1, or S2 species.

Protection Urgency Ranks and Management Urgency Ranks

The Protection Urgency Rank and the Management Urgency Rank are two mechanisms used to prioritize conservation action related to potential conservation areas. These two ranks summarize the urgency of the need for action and apply a timeline to focus action planning. Urgency ranks are based on current knowledge, but are not always known for a particular area. When this information is not available every effort is made to obtain it as soon as possible.

Protection Urgency Ranks

The urgency for protection rating reflects the need to take legal, political, or other administrative measures to alleviate threats that are related to land ownership or designation. The following codes are used to indicate the rating which best describes the urgency to **protect** the area:

- P1 - Immediately threatened by severely destructive forces, within 1 year of rank date; **protect now or never!**
- P2 - Threat expected within 5 years.
- P3 - Definable threat but not in the next 5 years.
- P4 - No threat known for foreseeable future.
- P5 - Land protection complete or adequate reasons exists not to protect the site; do not act on this site.

A protection action involves increasing the current level of legal protection accorded one or more tracts at a potential conservation area. It may also include activities such as educational or public relations campaigns or collaborative planning efforts with public or private entities to minimize adverse impacts to element occurrences at a site. It does not include management actions, i.e., any action requiring stewardship intervention.

Threats that may require a protection action are as follows:

- 1) Anthropogenic forces that threaten the existence of one or more element occurrences at a site, e.g., (a) development that would destroy, degrade or seriously compromise the long-term viability of an element occurrence; and (b) timber, range, recreational, or hydrologic management that is incompatible with an element occurrence's existence;
- 2) The inability to undertake a management action in the absence of a protection action, e.g., obtaining a management agreement; and
- 3) In extraordinary circumstances, a prospective change in ownership management that will make future protection actions more difficult.

Management Urgency Rank

The urgency for management rating focuses on land use management or land stewardship action required to maintain element occurrences at the potential conservation area. The following codes are used to indicate the action needed to be taken at the area:

M1 - (a) Management action required immediately or element occurrences could be lost or irretrievably degraded within one year.

(b) Ongoing annual management action must continue or element occurrences could be lost or irretrievably degraded within one year.

M2 - (a) New management action will be needed within 5 years to prevent the loss of element occurrences.

(b) Ongoing, recurring management action must continue within 5 years to prevent loss of element occurrences.

M3 - (a) New management action will be needed within 5 years to maintain current quality of element occurrences.

(b) Ongoing, recurrent management action must continue within 5 years to maintain current quality of element occurrences.

M4 - Although not currently threatened, management may be needed in the future to maintain the current quality of element occurrences.

M5 - No serious management needs known or anticipated at the site.

A management action may include biological management (prescribed burning, removal of exotics, mowing, etc.) or people and site management (building barriers, rerouting trails, patrolling for collectors, hunters, or trespassers, etc.). Management action does not include legal, political, or administrative measures taken to protect a potential conservation area.

PLANT SPECIES OF SPECIAL CONCERN SURVEY FORM
COLORADO NATURAL HERITAGE PROGRAM

C/O COLORADO STATE UNIVERSITY*103 NATURAL RESOURCES BUILDING*FT. COLLINS, CO 80523*(303)491-2844

DATE OF SURVEY: ___/___/___

OBSERVER(S) _____

TAXONOMY:

SCIENTIFIC NAME: _____

COMMON NAME _____

LOCATION: (Attach a copy of pertinent 7.5' or 15' topographic map section with locations of populations/subpopulations outlined, one map for each sensitive species described)

SURVEY SITE NAME: _____

COUNTY: _____

USGS QUADRANGLE: _____

TOWNSHIP: _____ RANGE: _____ SECTION: _____ 1/4 SEC.: _____

ADDITIONAL T/R/S, SECTIONS OR 1/4 SECS.: _____

UTM ZONE AND COORDINATES _____

ELEVATION (at population center (and range of population if known)): _____

NATIONAL FOREST/BLM DISTRICT: _____ F.S. DISTRICT/BLM RESOURCE AREA _____

LAND OWNERSHIP/MANAGEMENT (if not USFS/BLM): _____

DIRECTIONS TO SITE (refer to roads, trails, geographic features, etc.): _____

POPULATION SIZE:

ESTIMATED NUMBER OF INDIVIDUALS (or exact count, if feasible; if plants are spreading vegetatively, indicate number of aerial stems) _____

NUMBER OF SUB POPULATIONS (if applicable): _____

SIZE OF AREA COVERED BY POPULATION (acres): _____

BIOLOGY:

PHENOLOGY (percentage flowering, fruiting, vegetative): _____

ANY SYMBIOTIC OR PARASITIC RELATIONSHIPS? (e.g. pollinators): _____

EVIDENCE OF DISEASE, PREDATION OR INJURY? _____

REPRODUCTIVE SUCCESS (evidence of seed dispersal and establishment): _____

EVIDENCE OF THREATS AND DISTURBANCE: (be specific; effects on populations viability) _____

HABITAT:

ASSOCIATED PLANT COMMUNITY: (list dominant species currently present, include age structure if known): _____

HABITAT TYPE: _____

ADDITIONAL ASSOCIATED PLANT SPECIES: _____

VEGETATION STRUCTURE WITHIN POPULATION AREA:

TOTAL TREE COVER (%) _____ TOTAL SHRUB COVER (%) _____

TOTAL FORB COVER (%) _____ TOTAL GRAMINOID COVER (%) _____

TOTAL MOSS/LICHEN COVER (%) _____ TOTAL BARE GROUND COVER _____

ASPECT (S, SE, NNW, etc.): _____ % SLOPE _____ SLOPE SHAPE (concave, convex, straight, etc.) _____

LIGHT EXPOSURE (open, shaded, partial shade, etc.): _____

TOPOGRAPHIC POSITION (crest, upperslope, midslope, lowerslope, bottom, etc.): _____

MOISTURE: (dry, moist, saturated, inundated, seasonal seepage, etc.) _____

PARENT MATERIAL: _____

GEOMORPHIC LAND FORM (e.g. glaciated mountain slopes and ridges, alpine glacial valley, rolling uplands, breaklands, alluvial-colluvial-lacustrine (floodplains, terraces, etc.), rockslides): _____

SOIL TEXTURE: _____

DOCUMENTATION:

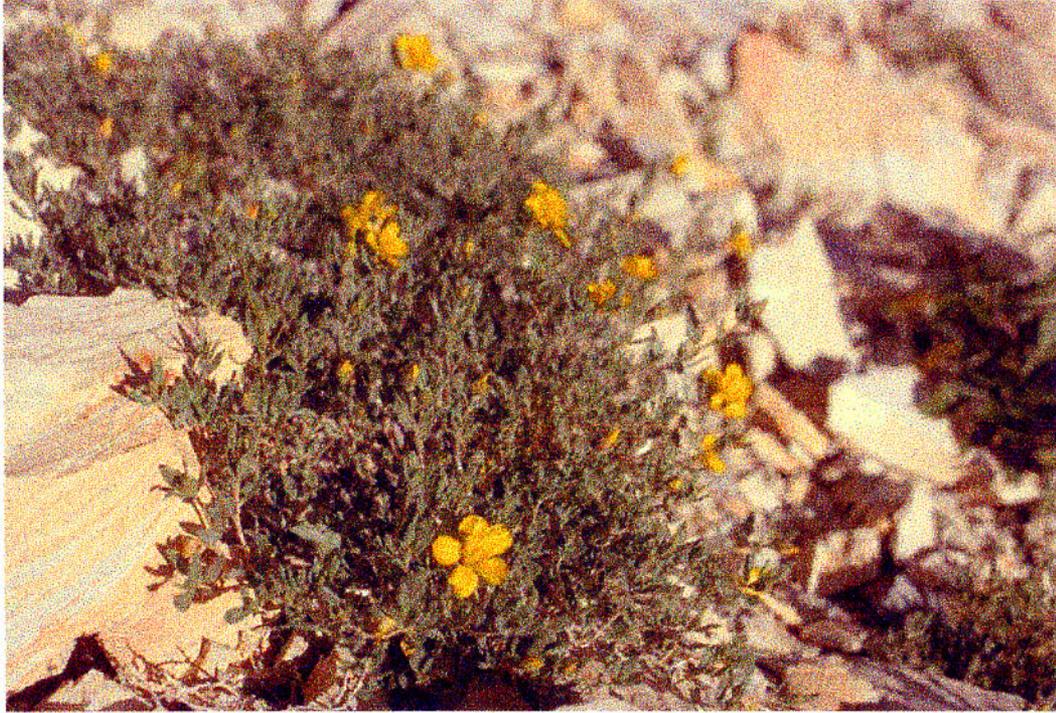
PHOTOGRAPH TAKEN? (if so, indicate photographer and repository): _____

SPECIMEN TAKEN? (if so, list collector, collection number, and repository): _____

IDENTIFICATION (list name of person making determination, and/or name of flora or book used): _____

ECODATA PLOT NUMBER (attach photocopied data sheets): _____

COMMENTS:



Photograph of Arapien Stickleaf (*Mentzelia argillosa*).

Plant Characterization Abstract for Colorado

MENTZELIA ARGILLOSA
ARAPIEN STICKLEAF

Taxonomy:

TAXCLASS: DICOTYLEDONEAE
FAMILY: LOASACEAE

ORDER: VIOLALES
GENUS: MENTZELIA

Status:

GLOBAL RANK: G3 STATE RANK: S2
FED. STATUS: AGENCY STATUS:

Habitat:

MINIMUM ELEV: 5800 feet
MAXIMUM ELEV: 9000 feet

HABITAT COMMENTS:

This species is adapted to survival in steeply sloping and constantly moving talus or scree slopes of the Arapien shale in Utah (Welsh and Chatterly 1985) and the Green River Formation shale in Colorado (O'Kane 1988). It is frequently found with other oil shale endemics, notably *Astragalus lutosus*, *Thalictrum heliophilum*, *Penstemon debilis*, and *Festuca dasyclada*.

State Distribution:

COUNTY NAME:
Garfield

RANGE:

Parachute Creek (Weber and Wittmann 1983) and tributaries and other Roan plateau drainages (e.g. Conn and Cascade Creeks), Garfield County. Possibly in Rio Blanco or Mesa Counties as well (pers. comm. Jennings 1995). The Utah and Colorado populations are over 200 miles apart, and may constitute two distinct species (Jennings 1995, pers. comm.) this genus has a tendency to readily speciate between sites and form local endemic populations (Jennings 1995 pers. comm.).

Phenology:

JAN1:	MAR1:	MAY1:	JUL1: Flower	SEP1: Fruiting	NOV1:
JAN2:	MAR2:	MAY2:	JUL2: Flower	SEP2:	NOV2:
FEB1:	APR1:	JUN1:	AUG1: Flower Fruiting	OCT1:	DEC1:
FEB2:	APR2:	JUN2: Flower	AUG2: Other Fruiting	OCT2:	DEC2:

PHENOLOGY COMMENTS:

In Colorado, this species flowers from late June through mid to late July (CNHP has observed it flowering at 8000 feet on the Roan Plateau in September 1995--wet year). It produces

fruits in August. (Welsh 1979). Peak flowering is likely in July (pers. comm. Jennings 1995).

Look Alikes:

Management:

MANAGEMENT COMMENTS:

The major threat to this species is oil shale and natural gas mining and retorting (O'Kane 1988).

Global Distribution:

Utah and Colorado

References:

ABBREVIATED CITATION:

FULL CITATION:

- | | |
|-------------------------|--|
| Coles 1994 | Coles, J. 1994. Personal communication about Rare Plant Guide Species. |
| Jennings 1995 | Jennings, W. F. 1995. Personal communication about Rare Plant Guide Species. |
| O'Kane 1988 | O'Kane, S. L. 1988. Colorado's Rare Flora. Great Basin Naturalist. 48(4):434-484. |
| Weber and Wittmann 1983 | Weber, W.A. and R.C. Wittmann. 1983. Additions to the flora of Colorado--IX. Phytologia 53 (3):191-193. |
| Welsh 1979 | Welsh, S.L. 1979. Status report for <i>Mentzelia argillosa</i> . Unpublished report prepared for the Colorado Natural Areas Program, Denver, CO. |
| Welsh and Goodrich 1987 | Welsh, S. L., N. D. Atwood, L. C. Higgins and S. Goodrich. 1987. Utah Flora. Great Basin Naturalist Memoirs, No. 9. Brigham Young University, Provo, UT. |

Element Global Ranking Report

MENTZELIA ARGILLOSA
SOUTHWESTERN STICK-LEAF

Element Description:

Arapien stickleaf, Loasaceae

Element Occurrence Definition:

Any location with one or more individuals. Occurrences should be considered separate if they are separated by more than one mile of unsuitable habitat, or by a distinct geologic feature such as ridges or drainages which creates unsuitable habitat.

Rank and Reasons:

GLOBAL RANK: G3

RANK DATE: 96-11-20

REASONS:

This is an oil shale endemic restricted to two distinct regions: central Utah and west-central Colorado. These two regions may eventually turn out to contain two distinct species of Mentzelia. Although it may be locally abundant at any given site, the overall range is narrowly restricted (20 miles by 4 miles in Utah, and approximately 30 square miles in Colorado. The threats are relatively high and protected occurrences are low.

Ranking Factors:

ESTIMATED
OCCURRENCES:

There are 33 known occurrences in Colorado, and 10 in Utah. Many occurrences are within close proximity to each other, for example 90% of the Colorado occurrences occur in a 10 sq mile area near the towns of Parachute and Rifle, Garfield County, Colorado. All of the Utah occurrences are in a 20 mile by 4 mile area containing all of Utah's potential habitat.

ABUNDANCE:

Two Colorado occurrences have been documented to contain over 7000 individuals while 5 others have 1000 plants. The other 22 occurrences within Colorado have either fewer than 500 individuals or more often an unknown number. There are no definite population numbers for the Utah occurrences, although Lori Armstrong states that it is locally common when found. (1996)

SPECIES RANGE:

There are two separate ranges for this species: Sanpete and Sevier Counties, Utah and Garfield County, Colorado. The range in Utah is approximately 20 miles long by 4 miles wide (Lori Armstrong, pers. comm. 1996). The Colorado range is

approximately 30 square miles. The Utah and Colorado populations are over 200 miles apart, and may constitute two distinct species (Jennings 1995, pers. comm.). This genus has a tendency to readily speciate between sites and form local endemic populations (Jennings 1995, pers. comm.).

TREND:

The trend is unknown, but is potentially stable at this time. Over half of the Colorado occurrences have not been observed since 1983. The trend in Utah is unknown, although gypsum mining is potentially destroying much of the potential habitat (Lori Armstrong, pers. comm. 1996).

**PROTECTED
OCCURRENCES:**

In Colorado the Natural Areas Program has designated the Mt Callahan site as a natural area to protect *Penstemon debilis* and other oil shale endemics, e.g. *Mentzelia argillosa*. There are no protected sites in Utah.

THREATS:

Oil and gas mining as well as mining shale for asphalt material are all possible threats for most of the known populations within Colorado. Utah has similar threats, along with Gypsum mining, especially on private lands. Most of the occurrences are on private land, many owned by oil companies.

FRAGILITY:

It occurs naturally on disturbed shale scree slopes.

OTHER CONSIDERATIONS:

Approximately 35% of Utah's potential habitat is privately owned and is either currently undergoing gypsum mining, or may be in the future.

Needs:

RESEARCH NEEDS:

We need to understand the similarities and differences between the Utah and Colorado populations, possibly by learning more about the genetics.

INVENTORY NEEDS:

A thorough inventory of the potential habitat in Garfield County, Colorado and eastern counties of Utah is needed. The Colorado occurrences should be revisited and verified.

PROTECTION NEEDS:

Protect largest occurrences, at least one site in Utah and one in Colorado.

STEWARDSHIP NEEDS:

Monitoring is needed for this species, since we know little about its natural history.

References:

ABBREVIATED CITATION: FULL CITATION:

Record Maintenance:

GRANKRESP: UTHP

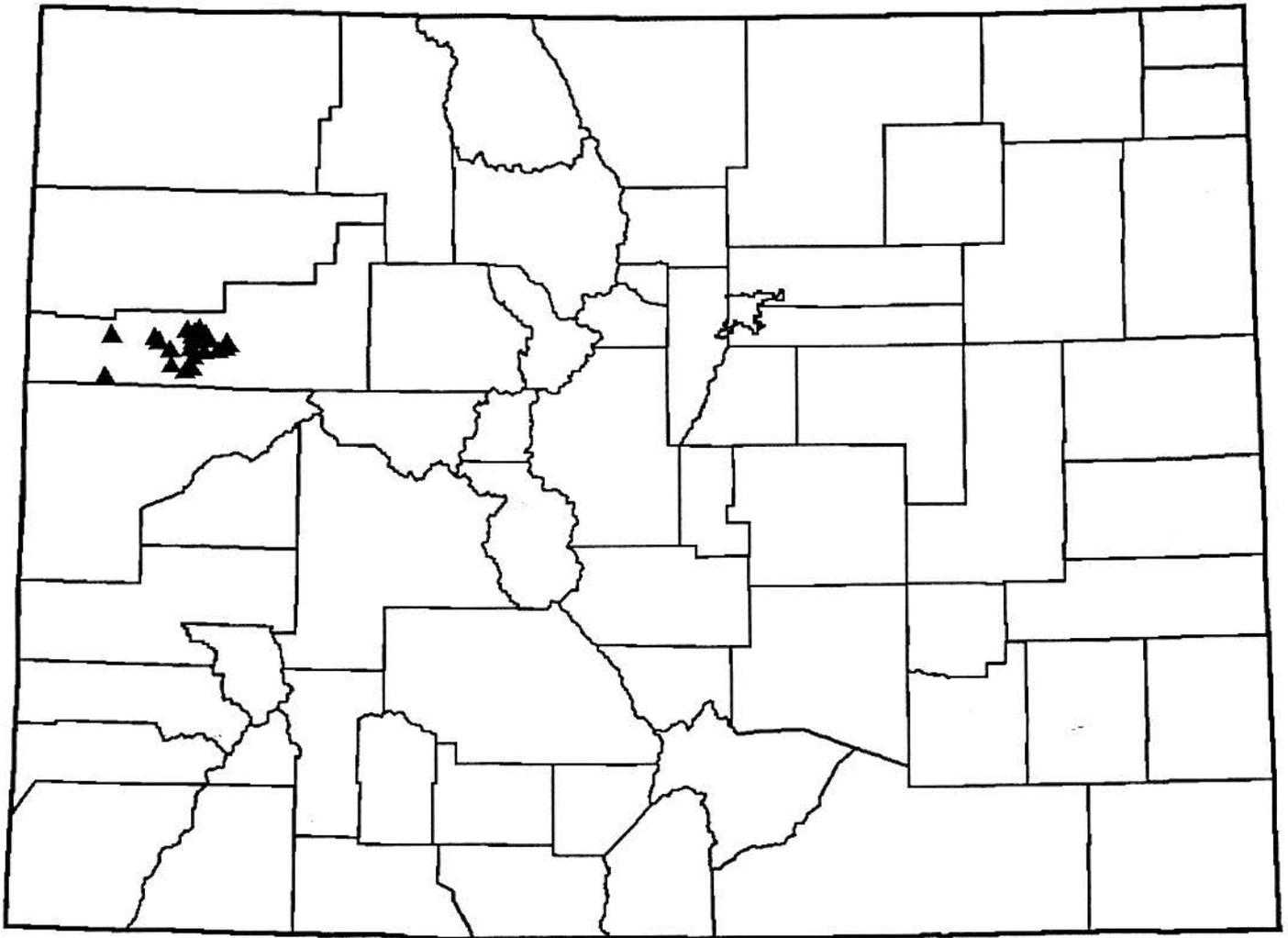
EDITION: 88-08-09

UPDATE: 96-11-27

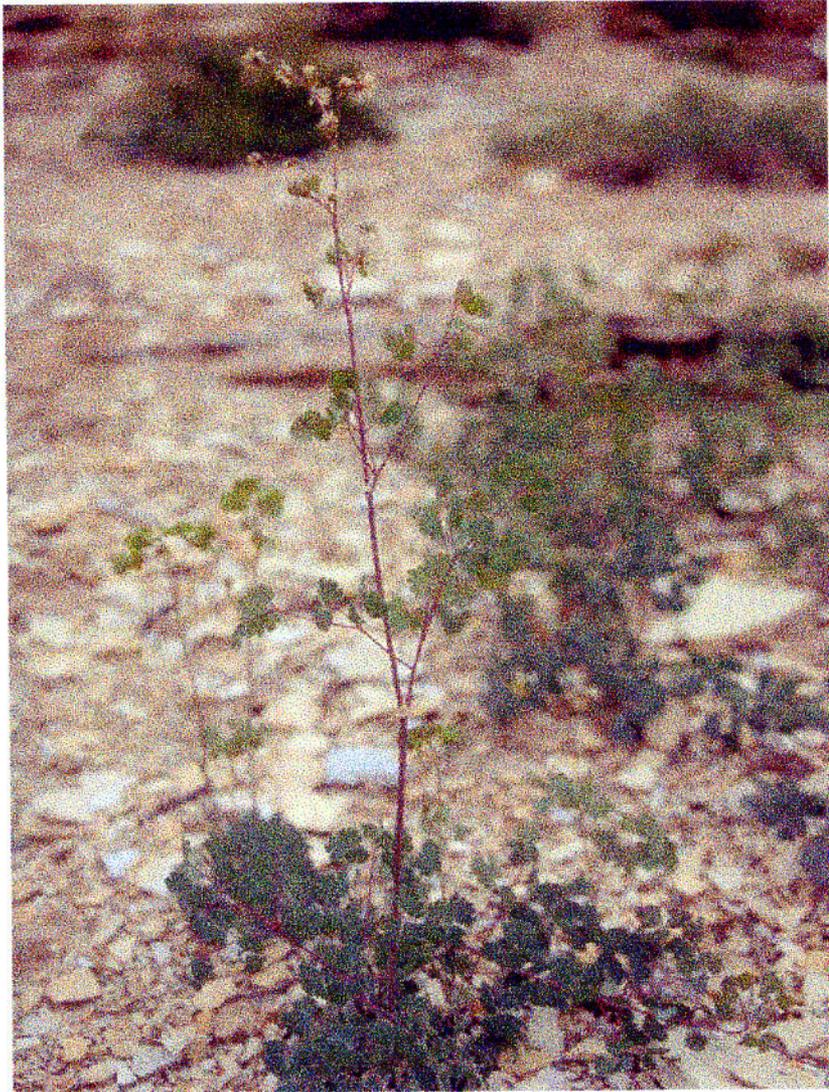
AUTHOR: Niese, J., rev. R. J. Rondeau

Mentzelia argillosa

Arapien Stickleaf



State Distribution Map – Historical and Extant Occurrences



Photograph of Sun-loving Meadowrue (*Thalictrum heliophilum*).

Look Alikes:

Thalictrum heliophilum grows in open sunny sites (heliophilum = sun loving) while most other Thalictrum spp. prefer at least some shade. Thalictrum fendleri has larger leaflets (10-17 x 8-12 mm) that are not waxy [glaucus], more pistils per flower, and occurs in Aspen groves and meadows (pers. comm. Minton November 1994).

Management:

MANAGEMENT COMMENTS:

Oil shale companies have successfully used this species to revegetate following shale extraction (O'Kane 1988). Further oil shale extraction could threaten natural populations.

Global Distribution:

Colorado endemic

References:

ABBREVIATED CITATION:

FULL CITATION:

O'Kane 1988

O'Kane, S. L. 1988. Colorado's Rare Flora. Great Basin Naturalist. 48(4):434-484.

Scheck 1994

Scheck, C. 1994. Special Status Plants Handbook Glenwood Springs Resource Area. Unpublished report prepared for the Bureau of Land Management, Glenwood Springs, CO.

Element Global Ranking Report

THALICTRUM HELIOPHILUM
SUN-LOVING MEADOWRUE

Element Description:

Ranunculaceae. NW Colorado endemic.

Element Occurrence Definition:

Any distinct location where this species is found.

Rank and Reasons:

GLOBAL RANK: G3 RANK DATE: 96-11-20

REASONS: 36 known occurrences; 130,000 individuals. Oil shale development threatens the habitat of this species throughout its range.

Ranking Factors:

ESTIMATED
OCCURRENCES:

36 known occurrences.

ABUNDANCE:

Estimated total number of individuals for T. heliophilum is roughly 130,000. Mt. Callahan is estimated to have 100,000 individuals; four eo's estimate 1,000-10,000 individuals; ten estimate 100-1,000; five estimate less than 100; the remaining occurrences do not provide estimate of population size.

SPECIES RANGE:

Known from the Piceance Basin, and Parachute and Roan Creek drainages in Rio Blanco, Garfield, and Mesa Cos.

TREND:

The trends are not determined, however, the populations seem to be viable and steady. The development of oil shale throughout T. heliophilum's habitat could change this trend.

PROTECTED
OCCURRENCES:

There are occurrences in two State Natural Areas, however, this does not provide specific protection for this species. 13 occurrences are on Bureau of Land Management land, 14 occur on private oil company land, and 1 on Department of energy.

THREATS:

Plants occur on oil shale bearing substrates. When oil shale extraction becomes economically viable this species could quickly become highly threatened.

FRAGILITY:

This species occurs on naturally disturbed habitat.

OTHER CONSIDERATIONS:

Needs:

RESEARCH NEEDS:

Need to understand/estimate trends, and obtain information about species fragility.

INVENTORY NEEDS:

Inventory of potential habitat would likely discover additional occurrences.

PROTECTION NEEDS:

Work with Colorado Natural Areas Program to protect Mt. Callahan, an exemplary occurrence of this species. 14 occurrences on BLM land and one on FS land should also be considered for protection. Keep close track of oil shale development proposals.

STEWARDSHIP NEEDS:

References:

ABBREVIATED CITATION:

FULL CITATION:

Record Maintenance:

GRANKRESP:

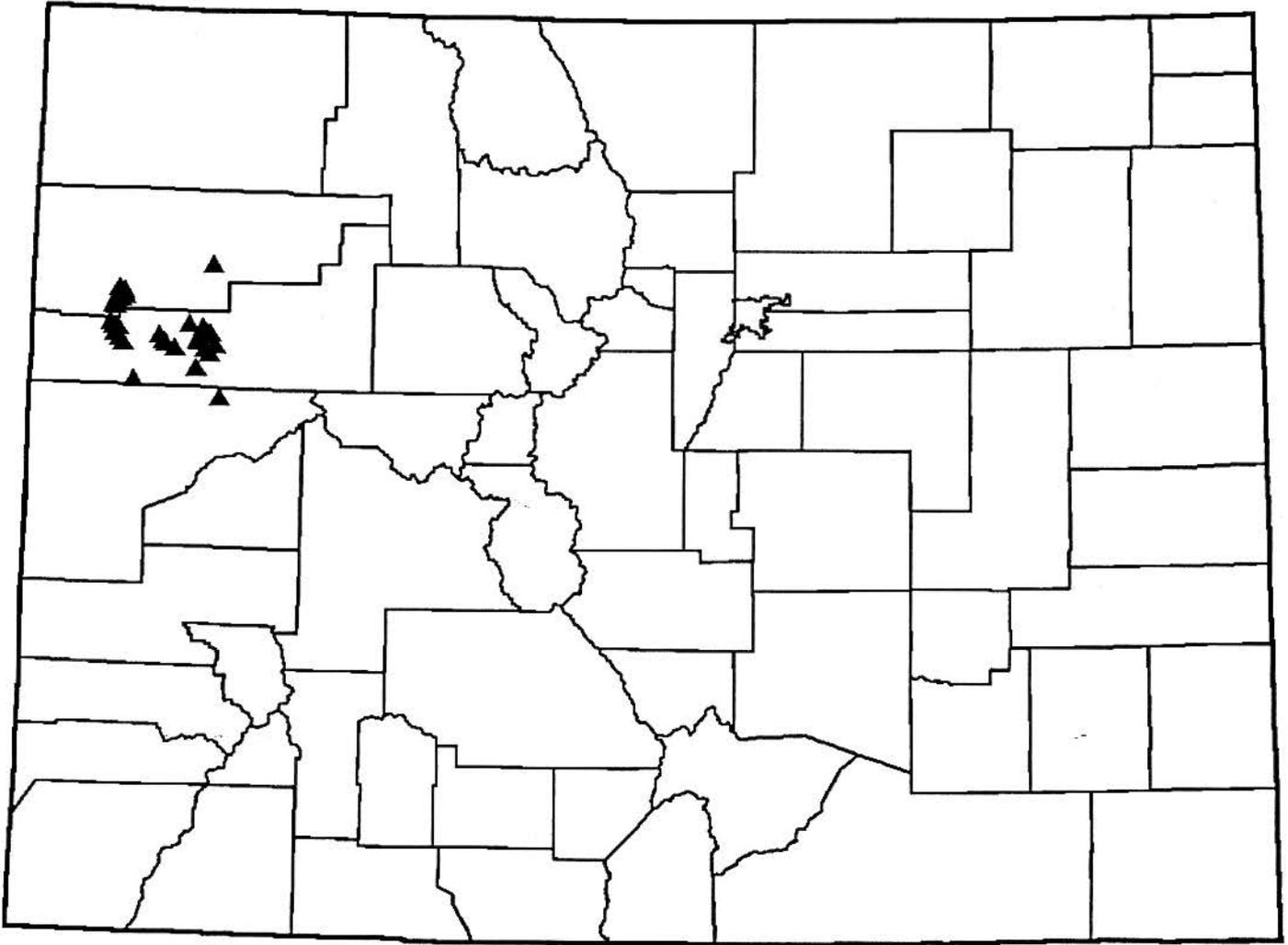
EDITION: 95-03-15

AUTHOR: S. Spackman

UPDATE: 96-11-20

Thalictrum heliophilum

Sun-loving Meadowrue



State Distribution Map – Historical and Extant Occurrences

Plant Characterization Abstract for Colorado

LESQUERELLA PARVIFLORA
PICEANCE BLADDERPOD

Taxonomy:

TAXCLASS: DICOTYLEDONEAE ORDER: CAPPARALES
FAMILY: BRASSICACEAE GENUS: LESQUERELLA

Status:

GLOBAL RANK: G2G3 STATE RANK: S2S3
FED. STATUS: AGENCY STATUS:

Habitat:

MINIMUM ELEV: 6200 feet
MAXIMUM ELEV: 8600 feet

HABITAT COMMENTS:

Endemic to outcrops of the Green River Shale Formation in the Piceance Basin. It grows on ledges and slopes of canyons in open areas. The soils are Torriorthent Rock outcrop complex (Peterson and Baker 1982). Frequently associated species include *Pinus edulis*, *Juniperus osteosperma*, *Eriogonum* sp. *Cirsium* sp, *Astragalus lutosus*, *Cercocarpus* sp., *Galium colordense*, *Oryzopsis hymenoides*, *Penstemon* sp., and *Machaeranthera* sp.

State Distribution:

COUNTY NAME:

Rio Blanco
Garfield
Mesa

RANGE: Rio Blanco and Garfield Counties. Also known from one collection in Mesa County (CNHP database).

Phenology:

JAN1:	MAR1:	MAY1:	JUL1:	SEP1:	NOV1:
			Flower		
			Fruiting		
JAN2:	MAR2:	MAY2:	JUL2:	SEP2:	NOV2:
			Fruiting		
FEB1:	APR1:	JUN1:	AUG1:	OCT1:	DEC1:
		Flower			
FEB2:	APR2:	JUN2:	AUG2:	OCT2:	DEC2:
		Flower			

PHENOLOGY COMMENTS:

Flowers in June through early July, fruits in July (Peterson and Baker 1982; pers. comm. Jennings 1995).

Look Alikes:

The recurved siliques and pedicels are similar to *L. arenosa* and *L. ludoviciana*. The fundamental differences are in the ovule number and the position of the funiculi on the replum

of the selique. The basal leaves are more similar to those of *L. ludoviciana*. (Rollins 1983; more details included). *L. parviflora* racemes are usually secund (one sided). Basal leaves are usually flat and generally dentate or somewhat angular. *L. ludoviciana* racemes are not secund. Basal leaves on this species are involute and usually entire (pers. comm Minton November 1994).

Management:

MANAGEMENT COMMENTS:

Several populations growing next to roads may be impacted by road maintenance and by off-road-vehicles leaving established rights of way. Oil shale extraction could severely affect other populations (O'Kane 1988).

Global Distribution:

Colorado endemic

References:

ABBREVIATED CITATION:

FULL CITATION:

O'Kane 1988

O'Kane, S. L. 1988. Colorado's Rare Flora. Great Basin Naturalist. 48(4):434-484.

Peterson and L 1982

Peterson, J. S. and W. L. Baker. 1982. Inventory of the Piceance Basin, Colorado: Threatened and Endangered Plants, Plant Associations, and the General Flora. Unpublished report prepared for the Bureau of Land Management, Craig, CO.

Rollins 1983

Rollins, R. C. 1983. Studies in the Cruciferae of Western North America. Journal of the Arnold Arboretum 64 (4).

Element Global Ranking Report

LESQUERELLA PARVIFLORA
PICEANCE BLADDERPOD

Element Description:

Plant, dicot, Brassicaceae.

Element Occurrence Definition:

Areas with individuals of this species clearly separated from other areas.

Rank and Reasons:

GLOBAL RANK: G2G3 RANK DATE: 96-11-20

REASONS: While there are 31 populations, very few appear specifically protected and potential oil shale development may pose a significant threat.

Ranking Factors:

ESTIMATED
OCCURRENCES:

31 occurrences as of Nov 1996. Mostly seconds records with four minutes records.

ABUNDANCE:

Most occurrences have hundreds to thousands of individuals. At least two have over 100,000 and four have over 10,000.

SPECIES RANGE:

Colorado endemic known from Rio Blanco and Garfield counties with one collection from Mesa County.

TREND:

The trends are unknown for this species but the occurrences seem to be viable.

PROTECTED
OCCURRENCES:

No protected occurrences. BLM White River RA refuses to provide special management designations. One occurrence states that the BLM removed habitat area from oil shale development.

THREATS:

Oil shale and gas resource development. Off-road vehicles a potential threat.

FRAGILITY: Specialized soil requirements.

OTHER CONSIDERATIONS:

Needs:

RESEARCH NEEDS:

INVENTORY NEEDS:

PROTECTION NEEDS:
BLM designation of type locality and at least one other site.

STEWARDSHIP NEEDS:

References:

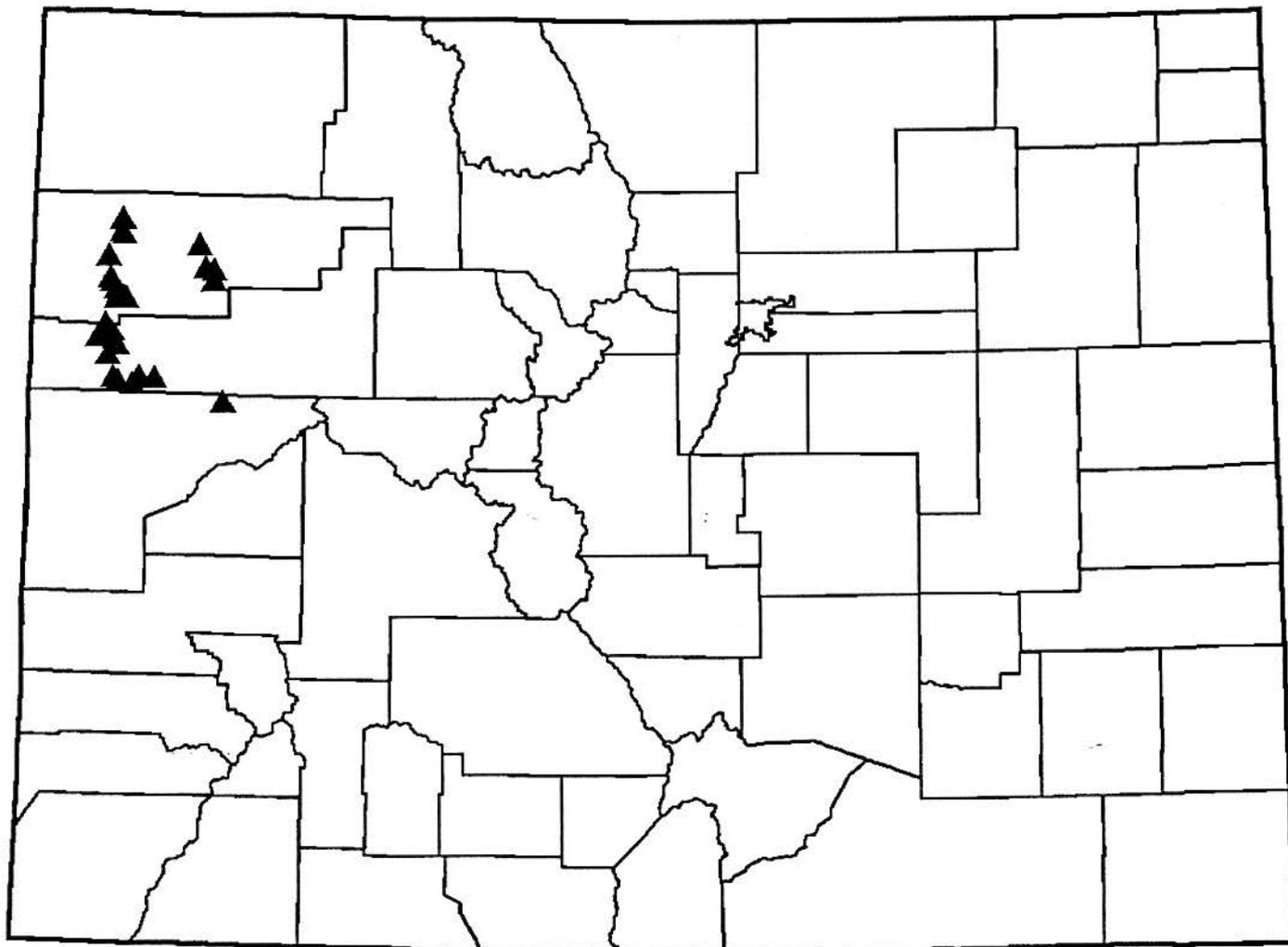
ABBREVIATED CITATION: FULL CITATION:

Record Maintenance:

GRANKRESP: COHP
EDITION: 95-03-16 AUTHOR: JM Burt
UPDATE: 97-02-26

Lesquerella parviflora

Piceance Bladderpod



State Distribution Map – Historical and Extant Occurrences



Photograph of Utah Fescue (*Festuca dasyclada*).

Plant Characterization Abstract for Colorado

FESTUCA DASYCLADA
UTAH FESCUE

Taxonomy:

TAXCLASS: MONOCOTYLEDONEAE
FAMILY: POACEAE

ORDER: CYPERALES
GENUS: FESTUCA

Status:

GLOBAL RANK: G3 STATE RANK: S3
FED. STATUS: AGENCY STATUS:

Habitat:

MINIMUM ELEV: 6500 feet
MAXIMUM ELEV: 9300 feet

HABITAT COMMENTS:

Moderate to steep exposed slopes or talus at the base of slopes, also on relatively moist, rocky streambanks on soils of the Green River Shale formation and Uinta sandstone formation (Scheck 1994, Emrich 1978).

State Distribution:

COUNTY NAME:
Garfield
Rio Blanco
Mesa

RANGE: Found in Garfield, Rio Blanco, and Mesa Counties on the Roan Plateau.

Phenology:

JAN1:	MAR1:	MAY1:	JUL1:	SEP1:	NOV1:
			Flower		
JAN2:	MAR2:	MAY2:	JUL2:	SEP2:	NOV2:
			Flower		
FEB1:	APR1:	JUN1:	AUG1:	OCT1:	DEC1:
FEB2:	APR2:	JUN2:	AUG2:	OCT2:	DEC2:

PHENOLOGY COMMENTS:

This species flowers in July through mid-August (Wiley-Eberle 1980).

Look Alikes:

Similar to *Oryzopsis hymenoides* because of growth form. Distinguished from other *Festuca* sp. because it has 2-flowered spikelets rather than 3 common for *Festucas* ().

Management:

MANAGEMENT COMMENTS:

The major threat to this species is oil shale mining

although off-road-vehicles, domestic livestock grazing and road construction also threaten it. Unless oil shale mining increases dramatically from 1988 levels, this species is not in imminent danger of extinction. Also, oil shale companies are using this species for re-seeding (O'Kane 1988).

Global Distribution:

References:

ABBREVIATED CITATION:	FULL CITATION:
Emrich 1978	Emrich, S. 1978. Status Report for <i>Aquilegia barnebyi</i> . Unpublished.
O'Kane 1988	O'Kane, S. L. 1988. Colorado's Rare Flora. <i>Great Basin Naturalist</i> . 48(4):434-484.
Peterson and L 1982	Peterson, J. S. and W. L. Baker. 1982. Inventory of the Piceance Basin, Colorado: Threatened and Endangered Plants, Plant Associations, and the General Flora. Unpublished report prepared for the Bureau of Land Management, Craig, CO.
Wiley-Eberle 1980	Wiley-Eberle, K.L. 1980. Threatened and endangered plant species: habitat classifications, descriptions, and associated plant species. Unpublished report prepared for the Colorado Natural Areas Program, Denver CO.

Element Global Ranking Report

FESTUCA DASYCLADA SEDGE FESCUE

Element Description:

Plant, monocot, Poaceace.

Element Occurrence Definition:

A specific site having one or more individuals and a visible boundary on the landscape.

Rank and Reasons:

GLOBAL RANK: G3

RANK DATE: 96-11-26

REASONS:

Narrow, restricted regional endemic; most of distribution underlain by oil shale deposits and owned by private oil companies; appears to be easily impacted by domestic livestock grazing. 54 occurrences with over 23000 individuals. However, probably close to 22 sites and is only found in four counties in two states.

Ranking Factors:

ESTIMATED

OCCURRENCES:

54 occurrences. 50 in Colorado; Most of these occurrences fall within larger sites which only total 18. 4 in Utah; the 2 early sites ('20) have been relocated & 2 new pop. are from Dixie & Uinta NF.

ABUNDANCE:

A total of 23100+ individuals have been reported from 50 occurrences in Colorado.

SPECIES RANGE:

Only known from Northern Garfield and southern Rio Blanco Counties, Colorado; Occurrences occur on 19 7.5" Quads which totals approximately 1000 square miles. Wasatch and Garfield Cos., Utah.

TREND:

Information on the trends of *F. dasyclada* are not available however, the populations seem to be stable and signs of decline have not been noted.

PROTECTED

OCCURRENCES:

The Mount Callahan site is a State Natural Area, however, the land is not specifically managed for the 4 rare plant species which occur there. Most of the occurrences are on

private oil company land (Exxon, Chevron, Union Oil, Occidental). There are four occurrences on Bureau of Land Management and five on Department of Energy land.

THREATS:

Oil shale development and gas drilling is the most prominent threat. Sheep grazing has had a major impact on its distribution.

FRAGILITY:

Appears to be extirpated by grazing livestock. This species occurs on naturally disturbed sites.

OTHER CONSIDERATIONS:

Needs:

RESEARCH NEEDS:

INVENTORY NEEDS:

BLM is monitoring the density of the population at one location in Colorado.

PROTECTION NEEDS:

Protect at least 2; 1 for total protection and 1 for scientific study to determine effects of grazing.

STEWARDSHIP NEEDS:

References:

ABBREVIATED CITATION:

FULL CITATION:

Record Maintenance:

GRANKRESP: COHP

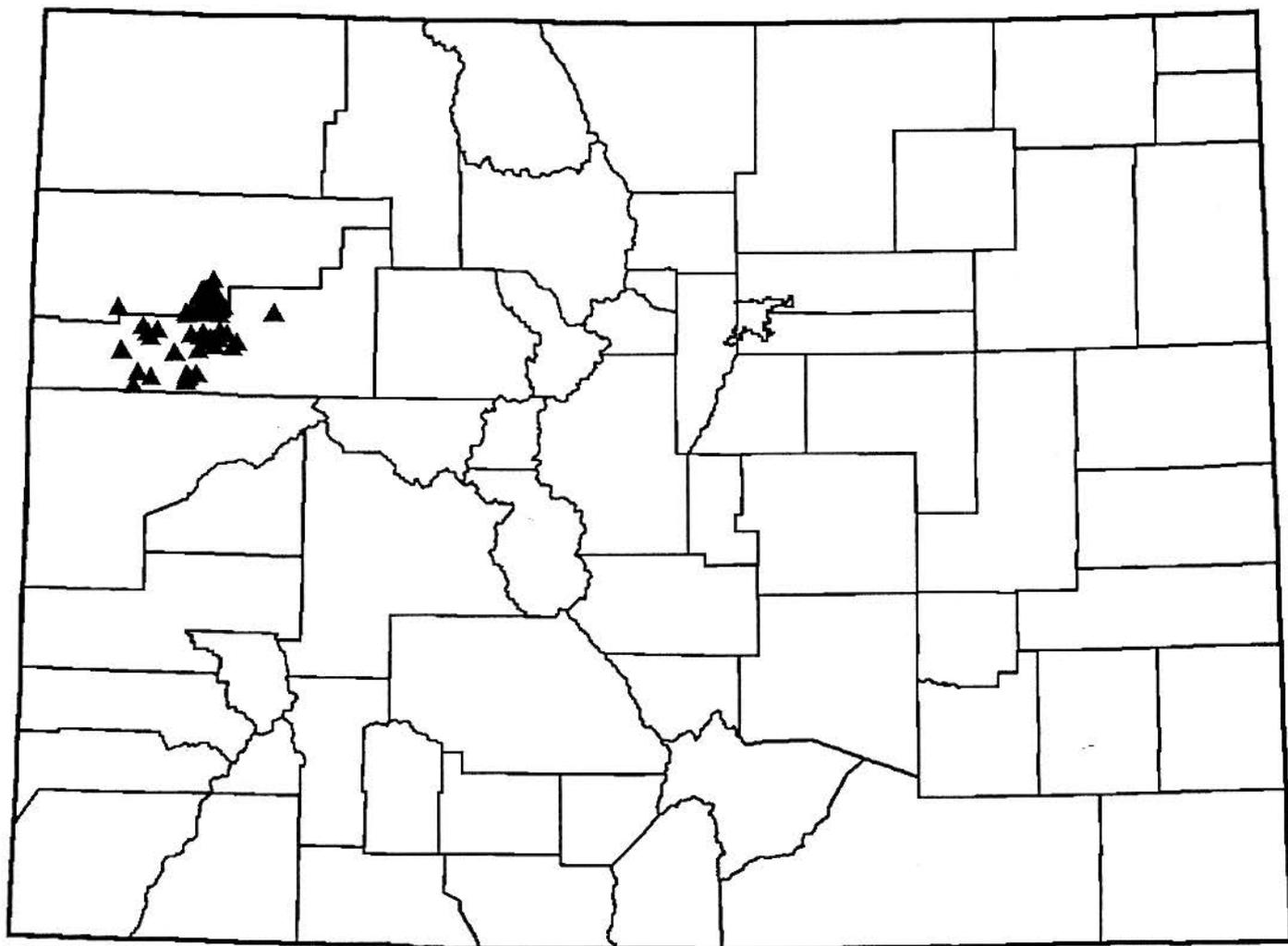
EDITION: 83-01-12

UPDATE: 96-11-27

AUTHOR: Peterson, J.S., rev. D. Atwood

Festuca dasyclada

Utah Fescue



State Distribution Map – Historical and Extant Occurrences



Photograph of Osterhout's Penstemon (*Penstemon osterhoutii*).

Plant Characterization Abstract for Colorado

PENSTEMON OSTERHOUTII

Taxonomy:

TAXCLASS: DICOTYLEDONEAE ORDER: SCROPHULARIALES
FAMILY: SCROPHULARIACEAE GENUS: PENSTEMON

TAXONOMIC COMMENTS:

The name *P. osterhoutii* was used for some plants of *P. pachyphyllus* var *pachyphyllus* from the eastern Uinta Basin (Graham, E. H. Ann. Carnegie Mus. 26: 333. 1937), but *P. osterhoutii* is a distinct species from just east of the Basin in Garfield, Eagle, and Routt counties, CO. The two taxa are similar in that they both have broadly expanded staminodes, but *P. osterhoutii* has lanceolate to ovate, acuminate leaves 4-9 cm long and 16-45 mm wide (Cronquist et al. 1984). *Penstemon lentus* is included in this genus according to Weber Flora of the West Slope 1996. Members of the *pachyphyllus* complex [*Penstemon pachyphyllus* var. *pachyphyllus*] in the Uintah Basin have been variously interpreted, with the name *P. osterhoutii* frequently misapplied (Welsh 1993). This species is closely related to *P. pachyphyllus*, which has a range farther west, from Nevada to northern Arizona. The staminode of the latter is linear-widened (about 1 mm.), and densely bearded with hairs much longer than the width of the staminode. A more complete series of specimens might relegate *P. osterhoutii* to subspecific rank (Harrington 1954).

Status:

GLOBAL RANK: G3Q STATE RANK: S2S3
FED. STATUS: AGENCY STATUS:

Habitat:

MINIMUM ELEV: 5300 feet
MAXIMUM ELEV: 8800 feet

HABITAT COMMENTS:

In gulches, canyons, and on sagebrush slopes; 5500-7200 feet (Harrington 1954). Locally common, sandy to clay soils, salt desert shrub, sagebrush, pinyon-juniper, and mt. brush communities, 5,300-8,800 feet (Goodrich and Neese 1986). Clay hills and slopes (Weber 1996).

State Distribution:

COUNTY NAME:

Mesa
Moffat
Eagle
Garfield
Routt

RANGE:

Mesa and Garfield Counties, Colorado. In Colorado, from Eagle to Moffat and Garfield counties (Harrington 1954). Just east of the Uinta Basin in Garfield, Eagle, and Routt counties (Cronquist et al. 1984). Colorado River drainage southwestward (Weber 1996).

Phenology:

JAN1:	MAR1:	MAY1: Flower	JUL1:	SEP1:	NOV1:
JAN2:	MAR2:	MAY2: Flower	JUL2:	SEP2:	NOV2:
FEB1:	APR1:	JUN1: Flower	AUG1:	OCT1:	DEC1:
FEB2:	APR2:	JUN2: Flower	AUG2:	OCT2:	DEC2:

PHENOLOGY COMMENTS:

May-June specimens from the Basin referred to *P. osterhoutii* belong here ().

Look Alikes:

The two taxa (*P. pachyphyllus* var. *pachyphyllus* and *P. osterhoutii*) are similar in that they both have broadly expanded staminodes, but *P. osterhoutii* has lanceolate to ovate, acuminate leaves 4-9 cm long and 16-45 mm wide (Cronquist et al. 1984). This species is closely related to *P. pachyphyllus*, which has a range farther west, from Nevada to northern Arizona. The staminode of the latter is linear-widened (about 1 mm.), and densely bearded with hairs much longer than the width of the staminode. Specimens of *P. osterhoutii* through most of its range have the staminodes 2-3 mm. wide (Harrington 1954).

Management:

MANAGEMENT COMMENTS:

The occurrences on private oil company land may be threatened by oil and gas development.

Global Distribution:

Northwestern Colorado and adjacent Utah (Harrington 1954).

References:

ABBREVIATED CITATION:

FULL CITATION:

Cronquist, et al., 1984

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1984. Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A. Volume 4. Subclass Asteride (except Asteraceae). The New York Botanical Garden, Bronx, NY. 573 pp.

Goodrich and Neese 1986

Goodrich, S. and E. Neese. 1986. Uinta Basin Flora. U.S.D.A. Forest Service, Ogden, UT.

Harrington 1954

Harrington, H. D. 1954. Manual of the Plants of Colorado. Sage Books, Denver, CO.

- Weber 1990 Weber, W. A. 1990. Colorado Flora: Eastern Slope. University Press of Colorado, Niwot, CO.
- Weber and Wittmann 1996 Weber, W.A. and Ronald Wittmann. 1996. Colorado Flora: Western Slope. University Press of Colorado.
- Welsh, et al., 1993 Welsh, S.L, N.D. Atwood, S. Goodrich, and L.C. Higgins. 1993. A Utah Flora, second edition, revised. Brigham Young University, Provo, UT.

Element Global Ranking Report

PENSTEMON OSTERHOUTII
OSTERHOUT'S BEARDTONGUE

Element Description:

Plant, short-lived perennial, Scrophulariaceae.

Element Occurrence Definition:

Distinct location with more than one individual. Occurrences should be considered new if they are separated from existing occurrences by more than one mile, or if the occurrences are separated markedly by distinct features on the landscape such as ridges, rivers, or roads.

Rank and Reasons:

GLOBAL RANK: G3Q RANK DATE: 96-11-20

REASONS: Limited habitat in 2 CO counties. 9 occurrences with 12500+ individuals. Renee Rondeau of CNHP says this species is common in its range. No sites protected from a moderate threat from gas and oil development.

Ranking Factors:

ESTIMATED
OCCURRENCES:

9 occurrences. This species is said to be common in its range but the taxonomy problems may be confusing the issue.

ABUNDANCE:

12500+ individuals reported from 4 of the 9 occurrences. Other records report the species to be common at the site. Renee Rondeau of CNHP says that this species is common in its range.

SPECIES RANGE:

Mesa and Garfield counties, Colorado. In Colorado, from Eagle to Moffat and Garfield Counties (Harrington 1954). Just east of the Uinta Basin in Garfield, Eagle, and Routt counties (Cronquist et al. 1984). Colorado River drainage southwestward (Weber 1996).

TREND:

The species seems to be stable but monitoring would be needed to be sure. The populations seem to be large and in good condition. The main threat is oil and gas development but this industry does not seem to be expanding at the moment.

PROTECTED
OCCURRENCES:

Most occurrences on BLM land. There are a few on private oil company land (Mobil) and also on DOE land.

THREATS:

The occurrences on oil company land may be threatened by oil and gas development.

FRAGILITY:

This species seem to occur in large populations in extreme habitat of shale barrens.

OTHER CONSIDERATIONS:

The name *P. osterhoutii* Pennell was used for some plants of *P. pachyphyllus* var *pachyphyllus* from the eastern Uinta Basin (Graham, E.H. Ann. Carnegie Mus. 26: 333. 1937), but *P. osterhoutii* is a distinct species from just east of the Basin in Garfield, Eagle, and Routt cos., CO. The two taxa are similar in that they both have broadly expanded staminodes, but *P. osterhoutii* has lanceolate to ovate, acuminate leaves 4-9 cm long and 16-45 mm wide. *Penstemon lentus* is included in this genus according to Weber Flora of the West Slope 1996. Members of the *pachyphyllus* complex [*Penstemon pachyphyllus* var. *pachyphyllus*] in the Uinta Basin have been variously interpreted, with the name *P. osterhoutii* frequently misapplied (Welsh 1993).

Needs:

RESEARCH NEEDS:

Taxonomy needs to be resolved.

INVENTORY NEEDS:

PROTECTION NEEDS:

STEWARDSHIP NEEDS:

References:

ABBREVIATED CITATION:

FULL CITATION:

Cronquist, et al., 1984

Cronquist, A., A.H. Holmgren, N.H. Holmgren, J.L. Reveal, and P.K. Holmgren. 1984. Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A. Volume 4. Subclass

Asteride (except Asteraceae). The New York Botanical Garden, Bronx, NY. 573 pp.

Weber 1990

Weber, W.A. 1990. Colorado Flora: Eastern slope. University Press of Colorado, Niwot, CO. 396 pp.

Weber and Wittmann 1996

Weber, W.A. and Ronald Wittmann. 1996. Colorado Flora: Western Slope. University Press of Colorado.

Welsh, et al., 1993

Welsh, S.L, N.D. Atwood, S. Goodrich, and L.C. Higgins. 1993. A Utah Flora, second edition, revised. Brigham Young University, Provo, UT.

Record Maintenance:

GRANKRESP: COHP
EDITION: 93-01-21
UPDATE: 97-02-26

AUTHOR: Annable, C.



Photograph of Wild Hollyhock (*Iliamna grandiflora*).

Plant Characterization Abstract for Colorado

ILIAMNA GRANDIFLORA

Taxonomy:

TAXCLASS: DICOTYLEDONEAE
FAMILY: MALVACEAE

ORDER: MALVALES
GENUS: ILIAMNA

TAXONOMIC COMMENTS:

I. crandallii, *I. grandiflora*, and *I. rivularis* are separated mainly on relative size of parts, but so much intergradation occurs in this respect in Colorado plants that the writer must tentatively consider them as synonyms (Harrington 1954). According to Weber, there seems to be doubt about the distinctness of *I. grandiflora*, *I. crandallii*, and *I. rivularis*, but they are relatively poorly collected; more field observations are needed (Weber and Wittmann 1996). Synonyms: *Sphaeralcea grandiflora*, *Phymosia grandiflora*.

Status:

GLOBAL RANK: G1Q
FED. STATUS:

STATE RANK: SU
AGENCY STATUS:

Habitat:

MINIMUM ELEV: 7000 feet
MAXIMUM ELEV: 10000 feet

HABITAT COMMENTS:

This species is found on banks, slopes, meadows, and along streams (Harrington 1954). It occurs in the mountains, mostly in damp meadows (Martin and Hutchins 1981).

State Distribution:

COUNTY NAME:

RANGE: Records of *I. grandiflora* are scattered in the western third of Colorado. Found in Mesa Verde and west of Ouray (Rydberg 1905).

Phenology:

JAN1:	MAR1:	MAY1:	JUL1: Flower	SEP1:	NOV1:
JAN2:	MAR2:	MAY2:	JUL2: Flower	SEP2:	NOV2:
FEB1:	APR1:	JUN1:	AUG1: Flower	OCT1:	DEC1:
FEB2:	APR2:	JUN2:	AUG2: Flower	OCT2:	DEC2:

PHENOLOGY COMMENTS:

I. grandiflora is flowering from July through August (Martin and Hutchins 1981).

Look Alikes:

Management:

MANAGEMENT COMMENTS:

Global Distribution:

References:

ABBREVIATED CITATION:

FULL CITATION:

Harrington 1954

Harrington, H. D. 1954. Manual of the Plants of Colorado. Sage Books, Denver, CO.

Martin and Hutchins 1981

Martin, W.C. and C.R. Hutchins. 1981. A Flora of New Mexico. Vols. 1-2. J. Cramer, Germany.

Weber and C 1996

Weber, William A. and Ronald C. Wittmann. 1996. Colorado Flora: Eastern Slope.

Element Global Ranking Report

ILIAMNA GRANDIFLORA
LARGE-FLOWER GLOBE-MALLOW

Element Description:

Holly hock.

Element Occurrence Definition:

Any location with one or more individuals. Occurrences should be considered new if they are separated from existing occurrences by more than one mile, or if the occurrences are separated markedly by distinct features on the landscape such as ridges, rivers or roads.

Rank and Reasons:

GLOBAL RANK: G1Q RANK DATE: 96-11-01

REASONS: Seven occurrences are known. Restricted range in Colorado. No protected occurrences. Four roadside occurrences.

Ranking Factors:

ESTIMATED
OCCURRENCES:

7 occurrences known in three counties.

ABUNDANCE:

Two individuals documented at one site, 1 at another. The number of individuals was not documented on the remaining records.

SPECIES RANGE:

Colorado endemic, mountains southwest of the Colorado River drainage (Weber 1996). Records from Montezuma, Pitkin, and Garfield Counties.

TREND:

PROTECTED
OCCURRENCES:

None known to be protected.

THREATS:

Four occurrences are roadside.

FRAGILITY:

OTHER CONSIDERATIONS:

Two related species [to *I. rivularis*] are listed for Colorado, *I. crandallii* (Rydb.) Wiggins and *I. grandiflora* (Rydb.) Wiggins. They are separated mainly on relative size of parts but so much intergradation occurs in this respect in Colorado plants that the writer has included them in the above description [*I. rivularis*] and tentatively must consider them as synonyms (Harrington 1954).

Needs:

RESEARCH NEEDS:

Taxonomy research.

INVENTORY NEEDS:

There seems to be doubt about the distinctness of these species, but they are relatively poorly collected. Field observations are needed (Weber 1996).

PROTECTION NEEDS:

STEWARDSHIP NEEDS:

References:

ABBREVIATED CITATION:

FULL CITATION:

Harrington 1954

Harrington, H. D. 1954. Manual of the Plants of Colorado. Sage Books, Denver, CO.

Weber and Wittmann 1996

Weber, W.A. and Ronald Wittmann. 1996. Colorado Flora: Western Slope. University Press of Colorado.

Record Maintenance:

GRANKRESP:

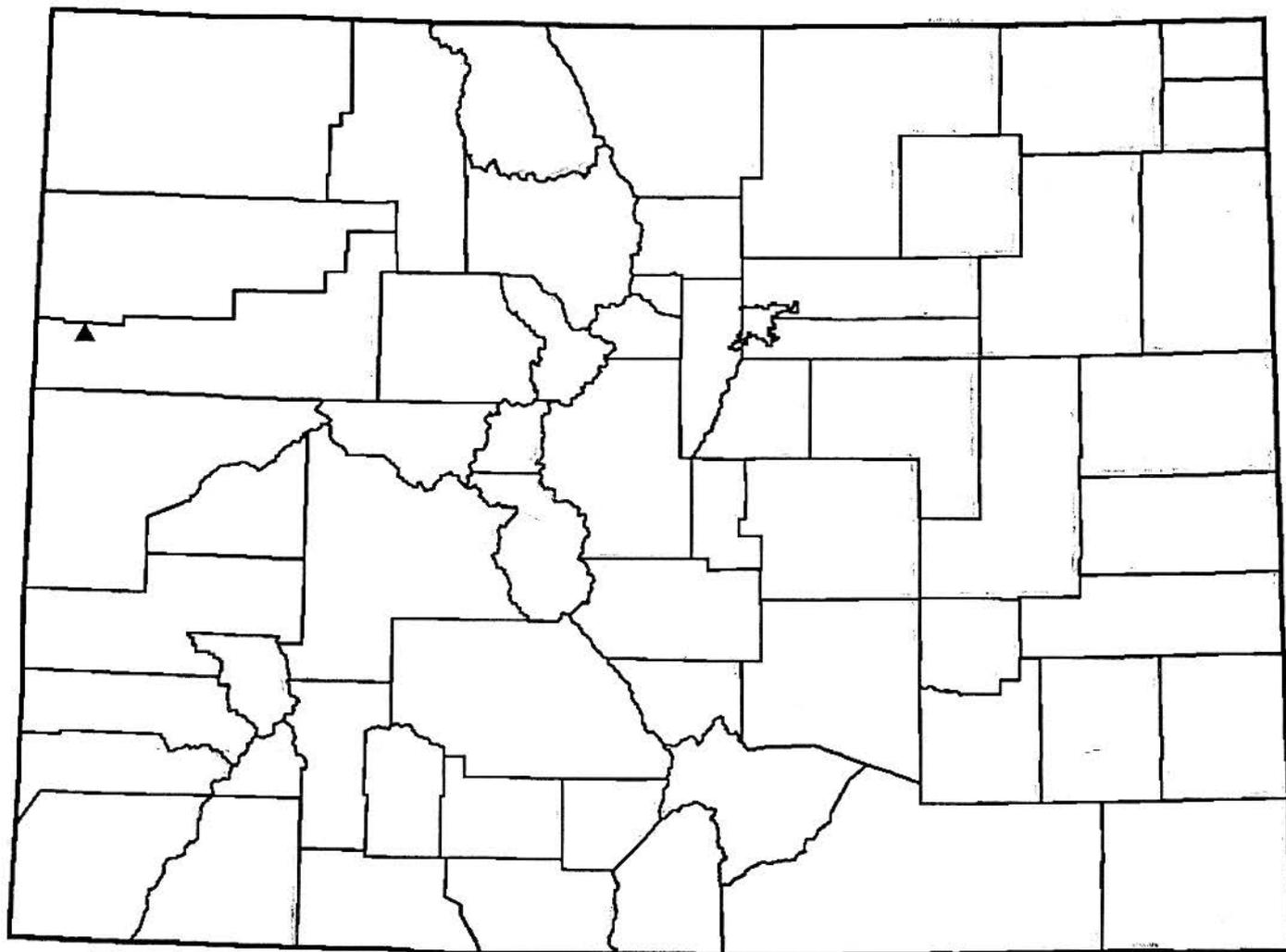
EDITION: 96-11-01

AUTHOR: Fayette

UPDATE: 96-11-27

Iliamna grandiflora

Wild Hollyhock



State Distribution Map – Historical and Extant Occurrences