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CENTER FOR NATIVE ECOSYSTEMS

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15 March 2004

Steven Williams, Director
U.S. Fish and Wildlife Service
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

and

Gale Norton
Secretary of the Interior
U.S. Department of the Interior
1849 C Street, NW
Washington, D.C. 20240

Dear Director Williams and Secretary Norton:

Enclosed please find a formal petition to list Parachute penstemon (*Penstemon debilis*) as threatened or endangered within its known historic range, pursuant to Section 4 of the Endangered Species Act (16 U.S.C. 1531 et seq.). Pursuant to 16 U.S.C. §§ 1533(b)(3)(c)(iii) and 1533(b)(7) and 50 C.F.R. § 424.20, Petitioners further petition the Secretary and FWS to promulgate a rule listing *P. debilis* on an emergency basis due to significant risks to the well being of this species. This petition is being submitted by Center for Native Ecosystems, Steve O'Kane, Jr., the Colorado Native Plant Society, and Janey Hines Broderick. This petition is filed under 5 U.S.C. 553(e) and 50 C.F.R. 424.14 (1990).

We understand that this petition sets in motion a specific process, with specific time constraints, placing specific response requirements on the U.S. Fish and Wildlife Service, including a letter confirming receipt of the petition. Thank you for your consideration of this matter.

Sincerely,

Jacob Smith
Executive Director

Cc: Ralph Morgenweck, Region Six Director, U.S. Fish and Wildlife Service
Robert Ukeiley, Esq.

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PETITION TO THE SECRETARY OF THE

UNITED STATES DEPARTMENT OF THE INTERIOR &

THE DIRECTOR THE OF FISH & WILDLIFE SERVICE

March 15, 2004

CENTER FOR NATIVE ECOSYSTEMS, STEVE L. O'KANE, JR. PH.D., COLORADO NATIVE PLANT SOCIETY, and JANEY HINES BRODERICK Petitioners, and GALE NORTON, SECRETARY OF THE DEPARTMENT OF INTERIOR, Respondent, and STEVE WILLIAMS, DIRECTOR OF THE U.S. FISH & WILDLIFE SERVICE, Respondent	PETITION TO LIST PARACHUTE PENSTEMON (*PENSTEMON DEBILIS*) AS THREATENED OR ENDANGERED, PREPARE AN EMERGENCY LISTING RULE, AND DESIGNATE CRITICAL HABITAT UNDER THE ENDANGERED SPECIES ACT (16 U.S.C. § 1531, *ET SEQ.*)

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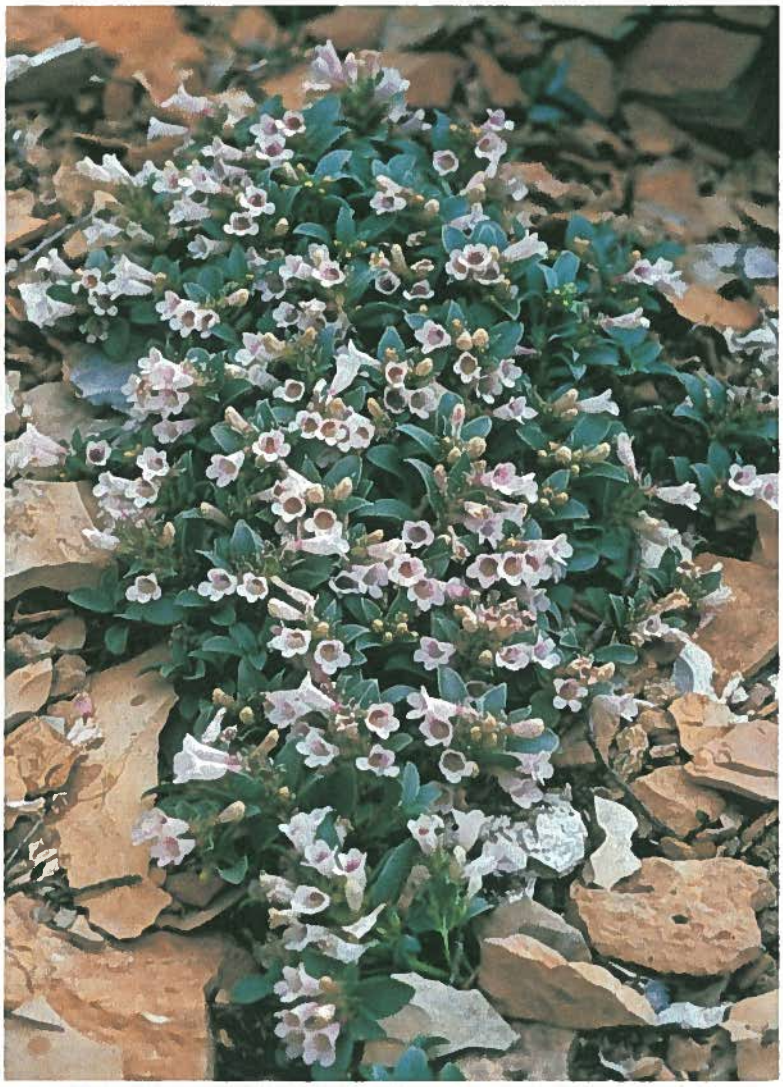
Photograph by Steve O'Kane, Jr.



I. INTRODUCTION

Parachute penstemon (*Penstemon debilis*) is among the rarest of plants in North America, known only from five locations along the cliffs of the Roan Plateau in Garfield County, Colorado. It is a beautiful plant with large white to pale purple-lavender flowers, and is restricted to steep, sparsely vegetated, oil shale slopes of the Green River Formation. The U.S. Fish and Wildlife Service ("Service") has long recognized that Parachute penstemon meets the criteria for listing as threatened or endangered under the Endangered Species Act (16 U.S.C. § 1531, *et seq.*) ("ESA"). 61 Fed. Reg. 7595, 7606 (Feb. 28, 1996) (Endangered and Threatened Species, Plant and Animal Taxa; Proposed Rule). Yet this rare wildflower has not received the protection necessary for its survival.

This petition and accompanying materials provide substantial scientific and commercial information establishing that Parachute penstemon meets the requirements for listing under the ESA, and requires ESA protection to prevent its extinction and ensure its persistence. Petitioners incorporate by reference every document cited in this petition as well as those cited in the References section (copies available upon request).

Current threats from oil, gas, and mineral extraction, noxious weeds, roads, recreation, seed collection, livestock, and climate change, combined with the rarity of the plant and its specific life history characteristics, point to a clear need to protect this plant under the ESA. Two of the three sizable populations, including the largest population, occur on private oil company land where they are completely unprotected. These unprotected populations account for over 90% of all known plants. Part of one of the populations found on federal land is in an area already leased for oil and gas, and significant impacts to all three federal land populations are expected under current federal policies encouraging extensive natural gas development in the Roan Plateau area.

Despite the plant's candidate status for listing under the ESA, in the absence of "threatened" or "endangered" status the U.S. Bureau of Land Management ("BLM") and the Service lack both the necessary tools and the political will to protect it from existing and foreseeable pressures - and to provide for its recovery from its current highly imperiled status. It is one of the rarest plants in North America yet no protection plan has been prepared. With two of its most significant populations located on private oil company land, and the other three found on inadequately protected BLM lands, the plant is in clear danger of extinction. Seven years ago biologists studying Parachute penstemon recommended that if stringent steps were not taken for the conservation of this plant within five years, the plant should be listed under the ESA. Spackman *et al.*, CNHP (1997), Discussion and Recommendations. Such conservation steps have never been taken.

Petitioners thus submit this petition to the Secretary of the Interior ("Secretary") and the Service pursuant to the ESA (16 U.S.C. § 1531, *et seq.*), its implementing regulations including those for listing (50 C.F.R. § 424), and the Administrative Procedures Act (5 U.S.C. § 553),

requesting that Secretary take the three following actions: (1) list Parachute penstemon as threatened or endangered; (2) promulgate an emergency listing rule for Parachute penstemon due to significant threats to its continued existence (16 U.S.C. §§ 1533(b)(1)(c)(iii), (7), and 50 C.F.R. § 424.20); and (3) designate critical habitat concurrent with the listing. This petition is filed under 5 U.S.C. § 553(e), 16 U.S.C. § 1533(b)(3)(A) and 50 C.F.R. § 424.19 (1987) which give interested persons the right to petition for issuance of a listing rule. Petitioners look forward to receiving the Secretary's finding regarding this petition within 90 days, as well as a formal acknowledgment of the Secretary's receipt of the petition.

II. PETITIONERS

Center for Native Ecosystems (CNE) is a non-profit advocacy organization dedicated to conserving and recovering native and naturally functioning ecosystems in the Greater Southern Rockies and Plains. We value the clean water, fresh air, healthy communities, sources of food and medicine, and recreational opportunities provided by native biological diversity. We also passionately believe that all species and their natural communities have the right to exist and thrive. CNE uses the best available science to forward its mission through participation in policy, administrative processes, legal action, public outreach and organizing, and education. The sage-steppe ecosystems of northwestern Colorado, northeastern Utah, and southern Wyoming, sometimes known as the Great Divide Ecoregion, are a conservation priority for CNE and its members. The region is high in biological diversity and is home to imperiled native species such as the white-tailed prairie dog and sage grouse. The Roan Plateau, which includes the entire known range of Parachute penstemon, is one key component of the Great Divide Ecoregion. Parachute penstemon is one of many native species facing severe threats from oil and gas drilling, inappropriate livestock grazing, and other activities.

Steve O'Kane, Jr., Ph.D. is one of the two botanists who discovered *Penstemon debilis* while surveying for other rare oil shale plants, and co-authored the paper describing the species. The discovery was made while was working for the Colorado Natural Areas Program in the mid 1980s. Upon first seeing the Parachute penstemon, Steve and his collaborator, John Anderson, were immediately aware that it was a new and unusual species that occupies one of the harshest and most vulnerable habitats in Colorado. Steve has been conducting field surveys in Colorado and the American West since 1978 and is currently working on the Flora of the Four Corners Region Project in collaboration with botanists from throughout the United States. As a professional botanist, Steve has a strong interest in rare flora, including *Penstemon debilis.* After earning a Master's degree in Botany from Colorado State University in 1984, he completed a Doctorate in Evolutionary and Population Biology from Washington University at St. Louis in 1993. Currently Steve is an Associate Professor at the University of Northern Iowa with primary research interests in Floristics and Plant Systematics and Evolution, and has published many botanical articles in periodicals such as Taxon, Systematic Botany, Annals of the Missouri Botanical Garden, Harvard Papers in Botany, and Novon. Steve believes that it is critical to ensure that *Penstemon debilis,* one of the rarest plant species on earth, receives federal protection for the plant and its habitat.

The Colorado Native Plant Society (CoNPS) is dedicated to the appreciation and conservation of the Colorado native flora. *Penstemon debilis* is a regional endemic that CoNPS has long had significant concerns about due to its limited global range and very high level of threat. CoNPS members include botanists who have observed this plant in the wild numerous times, and who intend to observe it again in the future. The oil shale soils which support this regional endemic are threatened by oil, gas, and mineral extraction, and CoNPS believes it is imperative that *P. debilis* receive federal protection so that the species and its habitat will be preserved for now and the future.

Janey Hines Broderick is a botanist who has lived in Parachute, Colorado at the base of the Roan Plateau since 1994. She is committed to the preservation of native plants, and has visited the Anvil Points Rim population of Parachute penstemon every year for nearly a decade to observe its health and status. She has worried that too many visitors or a major rock slide might damage the plants, and plans to continue to view the plants over the coming years. Janey believes it is important to seize the opportunity to ensure that Parachute penstemon, identified as not existing anywhere else, is preserved and passed on as a legacy to today's kids and future generations. Since 1995, Janey has had a landscape company where she is dedicated to growing her community's appreciation for native plants through promoting the use of abundant native xeric adapted plants.

III. PARACHUTE PENSTEMON ECOLOGY AND LIFE HISTORY

A. Taxonomy: Parachute penstemon is a very narrowly endemic, monotypic species

Penstemon debilis O'Kane & J. Anderson (Scrophulariaceae) is a monotypic species, endemic to Garfield County in western Colorado. It was first described by O'Kane and Anderson in a 1987 paper entitled "*Penstemon debilis* (Scrophulariaceae): A new species from Colorado endemic to oil shale." There have been no challenges to the Parachute penstemon's taxonomy as first put forward by O'Kane and Anderson.

O'Kane and Anderson (1987) found the plants while doing field work for status reports on four other plant species endemic to the Parachute Creek Member of the Green River Formation that occur in or near the Piceance Basin. Those four plants, all listed as candidate species at the time, were *Lesquerella parviflora* Rollins, *L. congesta* Rollins, *Physaria obcordata* Rollins, and *Thalictrum heliophilum* Wilkne & DeMott. O'Kane and Anderson (1987). Two of these (*Lesquerella congesta* (Dudley Bluffs Bladderpod) and *Phyasria obcordata* (Dudley Bluffs Twinpod)) were subsequently listed as threatened in 1990. 55 Fed. Reg. 4152 (February 6, 1990) (Final rule to determine Dudley Bluff Bladderpod and Dudley Bluffs Twinpod to be threatened species).

O'Kane and Anderson (1987) hypothesized about P. debilis's close relatives as follows:

> Anther morphology indicates that *Penstemon debilis* belongs in section *Glabri* (Rydb.) Pennell (subgenus *Habroanthus* Crossw.) in which the anthers sometimes dehisce as much as the full length from the distal end to the connective, with the valves only slightly

spread apart. Within section *Glabri, P. debilis* does not have any close relatives. Its low growth form is most similar to that of *P. uintahensis* Pennell, an alpine and treeline species of rocky and gravelly sites in the Uinta Mountains of northeastern Utah. Stem pubescence may indicate relationship to *P. fremontii* Torr. & Gray, a species of arid areas in the Uinta Basin, including the Piceance Basin, and adjacent Wyoming. Because anther dehiscence nearly across the connective is thought to be the primitive condition in section *Glabri* (Holmgren & Shultz, 1982), and because *P. debilis* does not have any close relatives, it is probably a less recently evolved member of the section.

O'Kane and Anderson (1987) originally believed Parachute penstemon to be a relictual species, and point out that the isolation provided by outcrops of oil shale can result in both the evolution of neoendemics and the conservation of relictual species. More recent phylogeny work by Dr. Wolfe suggests that Parachute penstemon may instead be a neoendemic. Pers. comm. Dr. Wolfe (2004b). This means that, as measured in evolutionary time, it branched off fairly recently. Dr. Wolfe's work suggests that while Parachute penstemon evolved more recently than some other penstemons in its section, there are other accepted penstemon species that are even more recently evolved. *Id.* Dr. Wolfe's work has not completely resolved the phylogeny of this set of penstemons, but the species comes out in a clade (or branch of the phylogenetic tree) of other *Habroanthus* taxa, including *P. cyananthus*, *P. leptanthus*, *P. caryi*, and *P. strictus* among many others and is not at the base of that clade, which supports the neoendemic hypothesis. Pers. comm. Dr. Wolfe (2004c).

In summary, Parachute penstemon is a very narrowly endemic, monotypic species with an unquestioned taxonomy. These taxonomic characteristics are indicative of high extinction vulnerability and, combined with the threats discussed below, underscore the need for protection as a listed species under the ESA.

B. Habitat: steep, south facing, oil shale outcrops of the Parachute Creek Member of the Green River Formation

Parachute penstemon is found on steep, south-facing oil shale outcrop slopes of white talus. O'Kane and Anderson (1987). An oil shale endemic, it is found on soil that is a mixture of thin shale fragments and clay. *Id.*; Rondeau *et al.* (1997). The plant is found only on the Parachute Creek Member of the Green River Formation in western Colorado. O'Kane and Anderson (1987). The habitat is sometimes described as shifting or constantly moving talus slopes. *See e.g.* U.S. Dep. of Interior, BLM, Glenwood Springs Field Office ("GSFO") (undated). Elevations of known populations range narrowly from approximately 2,400 to 2,800 meters (8,000 to 9,000 feet). Colorado Natural Heritage Program, Element Occurrence Records ("CNHP, EOR") (2003).[1]

A study of the edaphic characteristics, as well as the reproductive ecology of Parachute penstemon was conducted by Amy McMullen for her Master of Science thesis. McMullen

[1] Throughout this petition we have omitted all internal citations from the Element Occurrence Records to particular surveys.

(1998). The research found very high concentrations of mercury, selenium and arsenic at the site of one population (Mount Callahan East, discussed below) but not at the others. *Id.* at 70. McMullen wrote that among sites, the physical properties of the soils seemed more similar than the chemical properties. *Id.* at 68.

McMullen also reported that "many of the characteristics that are most similar among sites promote continual disturbance: steep slopes, unstable shale channer[2] surface layers, and no surface soil." *Id.* at 73. In turn, she noted that these features do not allow deep, well-developed soils to occur and that the weakly developed, shallow and rocky soils have very low water holding capacity, and thus do not support dense vegetative cover, contributing to further disturbance. *Id.* Based on the disturbance levels found at the known Parachute penstemon locations, including anthropogenic disturbance, she suggested that the plant "may be considered a pioneer species that disperses to recent disturbances, flourishes, and goes locally extinct if soil conditions become stable" and that "*Penstemon debilis'* perceived rarity may be a function of its ephemeral nature and adaptation to disturbed soils and not its lack of competitive ability or paleoendemic status." *Id.*

While Parachute penstemon clearly has adaptive features that allow it to persist on shifting slopes, its restriction to a specific substrate, very limited distribution and the longevity of some its known populations indicate that it is certainly not a typical pioneer species. For example, the two Mount Callahan populations, both substantial and long-lived, are on undisturbed sites. Similarly, the vast majority of plants at the Anvil Points Mine population are not located on areas with any recent anthropogenic disturbance. Additionally, in a survey of 27 areas likely to harbor Parachute penstemon based on a number of habitat features, only two new populations were found. Spackman *et al.*, CNHP (1997) (discussed further in § III(E)). Sites surveyed included some with anthropogenic disturbance, and only one of these, a Mount Logan road cut, harbored any plants. Pers. comm. Susan Spackman (2004b). At ten to twenty plants when first observed (CNHP, EOR, 2003), the Mount Logan population is the smallest ever discovered. By 1997, it had dwindled to three plants where it has remained until last observed in 2002. McMullen (1998); Pers. comm. Carla Scheck (2004a). Thus this disturbed habitat appears less than ideal for the plant.

A status review of *Eriogonum lewisii* Reveal (Polygonaceae) (Lewis Buckwheat) sheds some light on the topic of rare plants of the arid west colonizing recent disturbances. Morefield (1996). *Eriogonum lewisii* has been observed to "colonize and reproduce on recent, recovering disturbances such as road banks," and the author notes that he has "observed this to be true of many, if not most, rare plant species in the arid west." He explains that interpreting this to mean that these species are not threatened by habitat disturbance, but are able to survive or even thrive with continual disturbance, is usually a misinterpretation of plant responses based on short-term observation. He points out that disturbance can create a temporary low-competition situation that rare plants are able to take short-term advantage of, "[a]lmost never has a rare plant species

[2] Channer are thin, flat rock fragments of sandstone, shale, slate, limestone, or schist as long as 150 mm (6 inches) along the longest axis. Definition from: http://nesoil.com/glossary.htm.

been observed to continue spreading onto disturbances farther outside its rare habitat type, or to persist where disturbance is severe and continuous."

In the absence of more data about this plant's life history and habitat needs, it is critical to protect not only the existing populations, but also to proactively protect adequate suitable habitat for this plant to be able to colonize new areas in order to survive changes in local conditions.

C. Description: Parachute penstemon is distinct from other penstemon species

Parachute penstemon is a mat-forming perennial herb with thick, bluish leaves, each about 2 cm long and 1 cm wide, and funnel-shaped, white to pale lavender flowers that bloom during June and July. O'Kane and Anderson (1987). Field recognition characters for Parachute penstemon are its weak stems; soboliferous[3] habit; succulent, glabrous, and glaucous leaves; and its white to pale lavender corollas. *Id.*

Parachute penstemon is able to survive on the steep, unstable slopes where it is found by stem elongation as leaves are buried by the shifting talus. *Id.;* Colorado Native Plant Society (1989). O'Kane and Anderson (1987) explain that "[b]uried stems progressively elongate downslope from the initial point of rooting to a surface sufficiently stable to allow the development of a tuft of leaves and flowers."

O'Kane and Anderson (1987) provide the following technical description in their paper describing the species:

> Herbaceous perennial, forming mats. *Roots* fleshy. *Stems* arising from a subterranean soboliferous caudex, often branching and sometimes rooting at the nodes; subterranean parts with sessile, subulate, scalelike leaves 1-2.5 (5) mm long and 1.2-1.7 mm wide; above-ground parts glandular-puberulent distally, less so below. *Basal leaves* lacking; *cauline leaves* sessile, opposite, succulent, obovate, elliptic, or more commonly oblanceolate, tapering to base, the apex rounded or acute, some mucronate, glabrous, strongly blue-glaucous (olive-green when pressed), with narrow-white margins 0.2 mm wide (becoming greener when dried), entire to minutely erosulate (at 20x), 1.2-2.5 (3.2) cm long, 0.4-1.2 cm wide. *Thyrse* compact, of 2-4 verticillasters, cymules 1-2 flowered, subsecund; *sepals* lanceolate, 7-11.5 mm long and 1.5-2.5 mm wide, with white, erose and hyaline margins, glabrous; *corolla* (14) 17.5-20 mm long, slightly bilabiate, the lower lip longer than the upper, light lavender to nearly white, or sometimes deeper lavender, usually with a darker ring at the junction of the tube and throat, funnelform and slightly ampliate, slightly 2-ridged ventrally, glabrous throughout, tube 6-7 mm long, the throat (6) 7-9.5 (11) mm long; *staminode* 9-9.5 mm long, barely included to scarcely exserted, gradually and slightly expanding toward the truncate apex, sparsely golden-hairy on upper surface for most of its length with a loose tuft at apex, trichomes up to 0.9 mm in length; *fertile stamens* included; *anthers* bright magenta at anthesis, 0.9-1.4 mm long,

[3] Soboliferous habit is a growth habit where shoots are produced that run along under ground, forming new plants at short distances. Definition from: http://www.dictionarybarn.com/SOBOLES.php

dehiscent from apex to base almost to connective, surface sparsely hispid with white trichomes less than 0.4 mm long, the cells ultimately diverging from filament ca 30-45 degrees; *style* 9-10.5 mm long, clavate at tip. *Capsule* 2.5-5 mm wide, 3.5-7.5 mm long, the valves ovate with acute to acuminate tips, purple when fully expanded; *seeds* 1.5-2.5 mm long.

D. Similar species and look alikes: no species are confused with Parachute penstemon

Parachute penstemon is endemic to western Colorado. The only other penstemon species found on the Western Slope of Colorado that completely lacks aerial stems, like Parachute penstemon, is *P. acaulis* var. *yampensis*. NatureServe website, *Explorer* data for *Penstemon debilis* (visited Oct. 22, 2003) ("NatureServe (2003)"), *citing* pers. comm. McMullen (1998). However, it differs in its green, non-succulent leaves, and its habitat of gravelly river benches in the sagebrush zone. Weber and Wittmann (1996). Additionally, *P. caespitosus* is mat forming like Parachute penstemon, but its flowers are smaller and blue, and it has pubescent leaves. Thus Parachute penstemon is not confused with other species.

E. Reproduction: Parachute penstemon produces a low number of seeds, is primarily an outcrossing species, and has many different pollinators with assemblages varying between populations

McMullen (1998) found that Parachute penstemon is "primarily an outcrossing species, and that few fruit were produced by self-fertilization within a flower or between flowers on the same plant." At 87. The plant was found to require a pollinator "to set a significant amount of fruit." *Id.*

McMullen studied six breeding systems and optimal outcrossing distances. This research was conducted at the two largest populations which are found on Mount Callahan. Treatments (N=30) included autogamy (fertilization of a flower from itself), geitonogamy (fertilization of a flower by other flowers on same plant), and xenogamy (fertilization of a flower by a flower on a different plant) by plants at three distances (1-3 meters (m), 10-12m, 28-30m), and by a plant from another population (Mount Callahan West, discussed below). *Id.* at 19-20. Xenogamy produced significantly more and heavier fruit than either geitonogamy or autogamy. Autogamy produced only one fruit with three seeds, and geitonogamy produced four fruits with an average of six seeds per fruit. *Id.* at 44. The highest average number of seeds set per fruit was 13 (standard deviation = 5.68) and resulted from the xenogamy at 10-m (intermediate). *Id.* Seed numbers per fruit for xenogamy averaged 10.7 to 13.0. *Id.* Five plants were randomly selected as controls (at 20) and experienced 80% fruit set in both 1997 and 1998 (at 27), but no data regarding the number seeds produced is presented.

The differences in fruit set among the xenogamous crosses were not significant and regarding fruit weight, only the difference between the 1m and 10m crosses was significant. *Id.* at 25-26. McMullen cites the former as not supporting the hypothesis that either inbreeding or outbreeding depression is occurring, or that the two Mount Callahan populations are

reproductively isolated. *Id.* The latter is cited as not supporting the hypothesis that the two Mount Callahan populations are mechanically reproductively isolated or exhibit outbreeding depression from cross-population pollination. *Id.* She notes that there is very weak evidence for inbreeding depression occurring between crosses of near individuals in this population. *Id.*

Regarding pollinators, McMullen's research found that native bees are the primary pollinators of Parachute penstemon, and that there were differences in pollinator assemblages between populations. *Id.* at 27, 32-35. Temporal variation was also noted, with 1998 visitation rates showing considerable variation between days as well as between sites. *Id.* at 28.

At the two sites on Mount Callahan, *Osmia brevis* was found to be the primary pollinator, and bumblebee species (*Bombus* spp.) were also observed. *Id.* at 27. In addition, several species were collected at these sites in 1998 that were either not collected at all in 1997, or not found in abundance, including *Osmia grindelia, O. bruneri,* and *Atoposmia elongata*. *Id.*

In contrast, another site (Anvil Points Mine, discussed below) supported a pollinator community where *O. bruneri* and *Atoposmia elongata* were the dominant insect visitors, *O. cobaltina* (not found at Mount Callahan at all) and *O. grindelia* were collected in large numbers, and a large wasp, *Pseudomasaris vespoides,* was abundant. *Id.* at 28. *Osmia brevis* was also found at the Anvil Points Mine site, but no *Bombus* species. *Id.*

None of the major pollinators have been described as specialists on Parachute penstemon, though a wasp collected (at Anvil Points Mine) and some of species of the *Osmia* genus are considered *Penstemon* specialists. *Id.* (citing several sources omitted here). At the time of her research, and at the populations she studied, pollinators were not found by McMullen to be limiting Parachute penstemon reproduction. *Id.* at 87.

Osmia brevis, the primary pollinator found at the two Mount Callahan populations, is believed to be a ground nester because it has never been trapped in 25 years of intensive trap nesting by the U.S. Dep. of Agriculture's Bee Biology and Systematics Lab in Logan, Utah. *Id.* at 35. Regarding other *Osmia* species that pollinate Parachute penstemon, while nesting preferences of some *Osmia* species are unknown, it is known that some species "build their nests in wood and stems, on rocks, and in the ground (Hurd 1979)." Tepedino *et al.* (1999). For example, *Osmia bruneri* is known to make nest holes in stems or at other sites with preexisting holes. Frolich (1983); Michener (2000). *Atoposmia elongata* constructs nests of clumps of cells of sand and masticated plant material in rock crevices. Michener (2000), *citing* Parker (1977a).

More broadly, the genus *Osmia* contains 500 species and is composed solely of solitary bees. Bosch *et al.* (2001). A recent study of solitary bees found that they have a rather small foraging range making local habitat structure very important to the bees. Gathmann and Tscharntke (2002). Regarding reproduction of solitary bees, the study found that several resources, including "species-specific nest sties, specific materials for nest construction, nectar sources to maintain the activities of the adult bees and pollen as the essential component of the larval food" were critical. *Id.* (internal citation omitted).

The low number of seeds set, with thirteen the highest across six breeding systems studied, makes this species vulnerable to extinction. Additionally, its reliance on pollinators points to the need to conserve these species and their habitats.

F. Parachute penstemon is a long-lived perennial, making it especially susceptible to extinction

Parachute penstemon appears to be a long-lived perennial. Survey records do not indicate that life span has been specifically studied, but one distinctive plant observed when the Mount Logan population was discovered in 1996 was observed again in 2003. Pers. comm. Carla Scheck (2004a). This plant was described in 1996 as being very large, measuring approximately twelve inches across with many flowers. CNHP, EOR (2003). This means that this particular plant is at least seven years old, and likely older. *Penstemon grahamii*, with a life span of around nine years, is considered a relatively long-lived penstemon (CNE *et al.,* 2002 (citations omitted)); thus Parachute penstemon is also best considered a long-lived species.

Long-lived species such as this that are slow to reach sexual maturity and have low reproductive rates may be especially susceptible to extinction and difficult to recover. Nelson *et al.* (2001); Towns and Ferreira (2001). Elphick *et al.* (2001) stated that species with "long generation times may be most vulnerable to extinction because they cannot recover quickly following a population decline" (at 1286), and cited Beissinger (2000) as evidence that this may be the case. Webb *et al.* (2002) wrote that "[t]heory predicts that long-lived species with 'slow' life histories (small litters, slow growth, late maturation) should be at greater risk than short-lived species with high potential rates of increase." At 59. Their study of sympatric (occupying shared ranges) rare and common snake species produced results that "provide support for the hypothesis that species with slow life histories are more vulnerable to extinction." At 59. Likewise, Marzluff and Dial (1991) wrote that "[i]t is a common observation that low rates of reproduction, long generation times, and life in the upper trophic levels are shared attributes of extinction-prone species." At 429 (internal citation omitted). Thus Parachute penstemon's long-life span likely makes particularly susceptible to extinction.

G. Associated species: sites are sparsely vegetated

The sites where Parachute penstemon is found are only sparsely vegetated. They are reported to support scattered individuals of the following plants (four other Green River Formation endemics are listed first):

1. *Astragalus lutosus,* M. E. Jones (Green River Formation endemic) (O'Kane and Anderson, 1987; Rondeau *et al.*, 1997)
2. *Festuca dasyclada,* Hack. (Green River Formation endemic) (O'Kane and Anderson, 1987; Rondeau *et al.*, 1997)
3. *Mentzelia rhizomata,* Reveal (formerly reported as *Mentzelia argillosa,* J. Darl.) (Green River Formation endemic) (O'Kane and Anderson, 1987; Rondeau *et al.* 1997).
4. *Thalictrum heliophilum,* Wilken & Demott. (Green River Formation endemic) (O'Kane and Anderson, 1987)

5. *Agropyron spicatum* (Pursh.) Scribn. & Smith (O'Kane and Anderson, 1987)
6. *Cercocarpus montanus*, Raf. (O'Kane and Anderson, 1987)
7. *Chrysothamnus viscidiflorus,* (Hook.) Nutt. (O'Kane and Anderson, 1987)
8. *Cymopterus hendersonii* (Coult. & Rose) Cronq. (O'Kane and Anderson, 1987)
9. *Eriogonum lonchophyllum,* Torr. & Gray (O'Kane and Anderson, 1987)
10. *Galium coloradoense,* W. F. Wright (O'Kane and Anderson, 1987)
11. *Holodiscus dumosus,* (Nutt.) A. A. Heller (O'Kane and Anderson, 1987)
12. *Machaeranthera grindelioides,* (Nutt.) Shinners (O'Kane and Anderson, 1987)
13. *Monardella odoratissima,* Benth. (O'Kane and Anderson, 1987; Rondeau *et al.*, 1997)
14. *Penstemon caespitosus,* Nutt. (NatureServe (2003) *citing* A. McMullen, pers. comm. 1998)
15. *Penstemon mensarum*, Pennell. (NatureServe (2003) *citing* A. McMullen, pers. comm. 1998)

McMullen (1998) found that the distance to the nearest neighbor for Parachute penstemon was greater than for *Penstemon caespitosus*, another, more common penstemon found on Green River Shale outcrops and elsewhere. At 64. This may indicate that Parachute penstemon is less tolerant of competition. *Id.* at 69.

H. Geographic distribution: Parachute penstemon is known from only five sites along the cliffs of the Roan Plateau in Garfield County, Colorado

There are five known populations of Parachute penstemon. All are located along the cliffs of the Roan Plateau, in western Colorado's Garfield County. They are all within the geologically defined energy-rich Piceance Basin.[4] Collectively, they are known from less than 200 total acres. Spackman *et al.*, CNHP (1997), Introduction. The total area of the plant's geographic range is a narrow band around one to two miles wide and approximately 17.5 miles long.[5]

There is a report of a sixth group of plants found on Occidental Oil land "above Logan Wash" (McMullen, 1998 at 4, 17) which runs roughly east-west approximately one mile north of Mount Logan. This population is not in the Colorado Natural Heritage Program database. This remains an unconfirmed population because the land is private and botanists have not had access to verify the plants. Pers. comm. Peggy Lyon (2004). Depending on its exact location along Logan Wash, this population is either within the existing range or extends the existing range by up to approximately one mile.

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[4] The geologically defined Piceance Basin is used for analysis of oil and gas resources and stretches as far south as Montrose. There is also a hydrologically, or surface, defined Piceance Basin that includes the northern portion of the Roan Plateau, but not the area where the Parachute penstemon populations are found. We use the geologically defined Piceance Basin in this petition.

[5] The range is also reported as approximately 13 km x 22 km (8 miles x 14 miles). McMullen (1998) at 3; Spackman *et al.*, CNHP (1997) Introduction. This appears to be the range if drawn as a rectangle using north-south and east-west lines, for which we calculate 10 miles x 14.3 miles.

Surveys of the Parachute penstemon habitat are quite extensive and the plant is believed to be limited to its known range. As of 1995, although extensive rare plant surveys had been conducted on oil shale lands of the Green River Formation, only two populations of Parachute penstemon had been located. Spackman *et al.*, CNHP, (1997), *citing* Harner and Associates (1984); Peterson and Baker (1982); Union Oil Company of California (1984).

A study conducted by the Colorado Natural Heritage Program in 1997 further helped establish that additional surveys were unlikely to locate many more populations. Spackman *et al.*, CNHP (1997). Using existing distribution, habitat information, aerial photographs, soil surveys, and topographic and field maps, they identified 27 areas to survey for Parachute penstemon, including the two then known locations. *Id.*, Methods. Identification of survey areas was not influenced by ownership; in those cases where permission was not granted by a land owner, roadside surveys were conducted. *Id.*

Out of the 27 areas surveyed, two new populations were located. *Id.* These new populations extended the range by about four miles. *Id.*, Results. Among the areas surveyed where no plants were found were sites with recent anthropogenic disturbance as well as undisturbed sites. Pers. comm. Susan Spackman (2004b). Based on these results, they concluded that it is unlikely that many new locations of Parachute penstemon will be located. *Id.*, Discussion and Recommendations. In fact, in the eight years since this report was written only one new population (Anvil Points Mine) has been located. CNHP, EOR (2003).

It is possible that some private lands remain under- or unsurveyed. However, it is reasonable to infer from the extensive search efforts on public and private lands to date that it is highly unlikely that many populations remain unknown on private lands. Even the discovery of a few additional populations of Parachute penstemon will not change the fact that this is truly a very rare plant. Additionally, since much of the private land within the Parachute penstemon habitat is owned by oil companies, if unknown populations do exist on private land they are unprotected and face great risks (see § 7 below).

Genetic work conducted on Parachute penstemon indicates that it may have been more prevalent in the past. Results of work done by the Wolfe Lab at Ohio State University suggest that Parachute penstemon currently represents the fragmented remains of a once much larger metapopulation. Pers. comm. Dr. Wolfe (2004a). In 1997, leaf material from 114 individuals at the five known occurrences was collected, and intersimple sequence repeat analysis was performed on DNA extracted from this material. Randle *et al.* (undated). Some specific results and implications of this work are discussed below in § IV.

In summary, the five known populations of Parachute penstemon are located in a narrow band along the cliffs of the Roan Plateau. Suitable habitat has been extensively surveyed, making it unlikely that many more undiscovered populations exist.

IV. SPECIFIC PARACHUTE PENSTEMON POPULATIONS

The five known populations of Parachute penstemon are all located along the cliffs of the Roan Plateau. Collectively, they are known from less than 200 total acres, all within Garfield County in western Colorado. Spackman *et al.*, CNHP (1997), Introduction. Using the plant numbers (including estimates for populations where only rosettes have been counted) from Table 1 (p. 26), fewer than 750 plants are known from all five populations. See the following pages for Figure 2, a general location map of Parachute penstemon populations; Figure 3, a map of Parachute penstemon population sizes and land ownership, and Table 1, information regarding plant numbers, rosettes and owner for each population.

Two of the populations are located on private land owned by Occidental Oil Shale, Inc. ("Occidental Oil"),[6] and three are located on land managed by the Glenwood Springs Field Office of the BLM. The populations are found in two complexes along the Roan Plateau, separated by approximately 10 miles. The western complex includes the Mount Callahan East (Occidental Oil), Mount Callahan West (Occidental Oil), and Mount Logan (BLM) populations. This complex is located along the Roan Cliffs north of DeBeque, occurring over a total range of approximately five miles. Assuming that the unconfirmed sixth population "above Logan Wash" fits the pattern of being located on the southern escarpment of the Roan Plateau, it would be located either within the existing range of this western complex or slightly outside of it by up to approximately one mile.

The eastern complex includes the Anvil Points Rim (BLM) and Anvil Points Mine (BLM) populations. This complex occupies the Roan Cliffs northwest of Rifle, with the latter located at the old Anvil Points Mine and the former occurring less than three miles to the northeast. Results of the genetic work conducted by the Wolfe Lab indicate that the western and eastern complexes are significantly differentiated. Pers. comm. Dr. Wolfe (2004a). Each complex represented a distinct phenetic cluster. *Id.* This indicates that is important to consider the health of, and threats to, each complex as well as to the populations individually in order to conserve existing genetic diversity.

In assessing the plant numbers it should be noted that some fluctuation in survey results between years is inevitable. This is in part due to the growth habit of the plant which can make it difficult to determine which rosettes belong together to a given plant since the connecting stems are buried under the talus. Pers. comm. Susan Spackman (2004a). The number of plants can often be fairly accurately determined based on growth patterns, but differences in reported plant numbers may occur when these patterns are hard to determine. Additionally, the population numbers of other penstemon species are known to sometimes naturally fluctuate significantly

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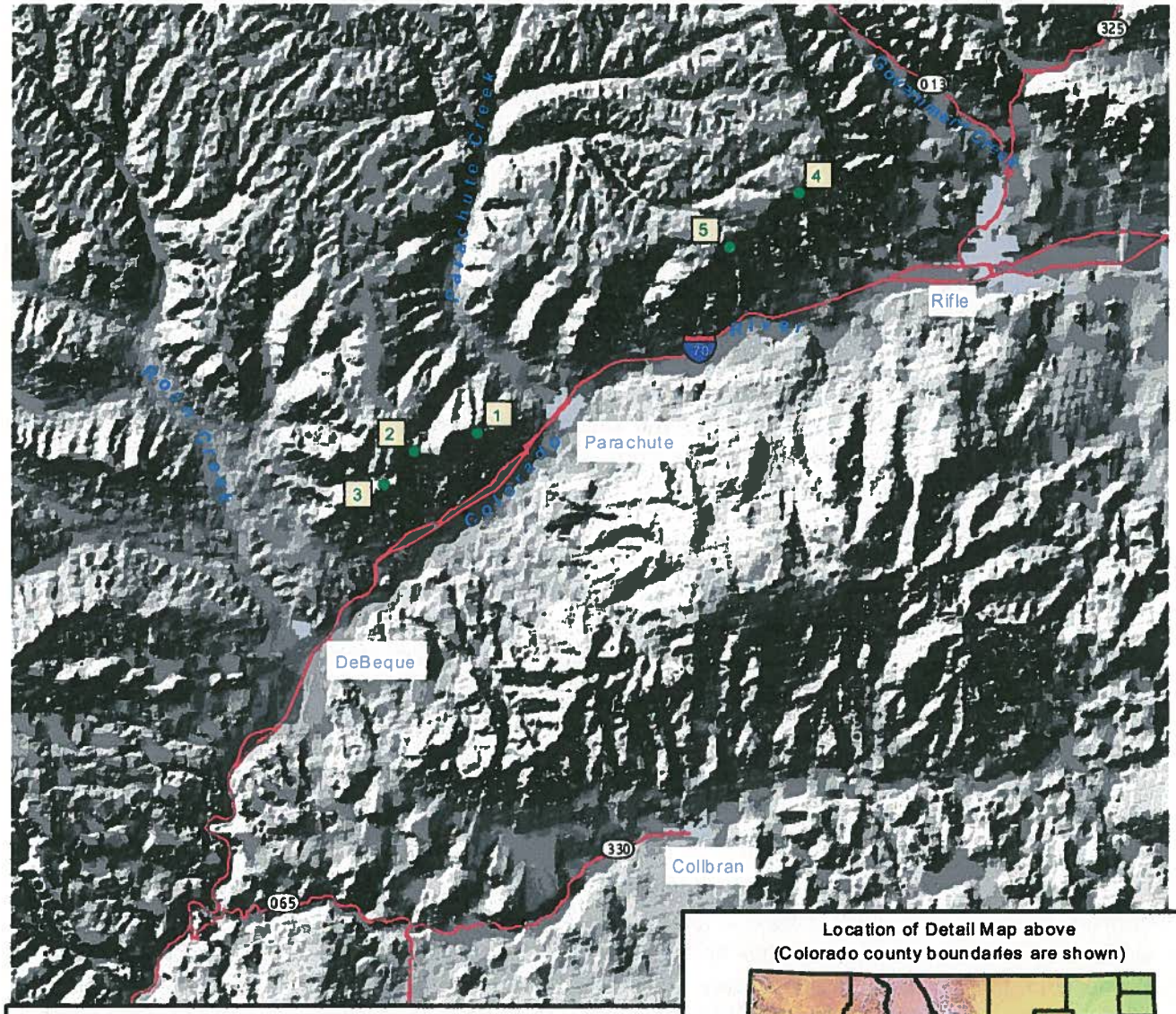
[6] Some reports cite the owner of these parcels as Occidental, some as Occidental Oil, and still others as Occidental Oil Shale, Inc. An Assessors Property Search in the Garfield County on-line database (visited Jan. 28, 2004) http://www.mitchandco.com/realEstate/garfield/) showed that the owner of the private parcels known to contain Parachute penstemon populations is Occidental Oil Shale, while other Garfield County parcels were owned by Oxy USA, Inc. The address recorded is the same for both owners. Oxy is the New York Stock Exchange identifier for Occidental Petroleum Corporation. Based on this information, we have shortened the owner's name to Occidental Oil.

Figure 2. General location of Parachute penstemon populations.



Legend

- Parachute penstemon populations:
  1. Mount Callahan East
  2. Mount Callahan West
  3. Mount Logan
  4. Anvil Points Rim
  5. Anvil Points Mine
- Major roads
- Cities and towns

N W E S

1 0 1 2 3 4 5 Miles

CNE 2004

Location of Detail Map above
(Colorado county boundaries are shown)

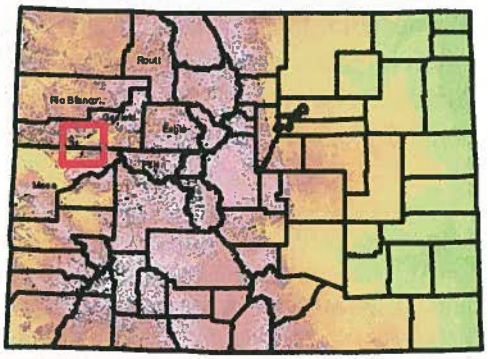


Fig. 3. Parachute penstemon population sizes and land ownership.

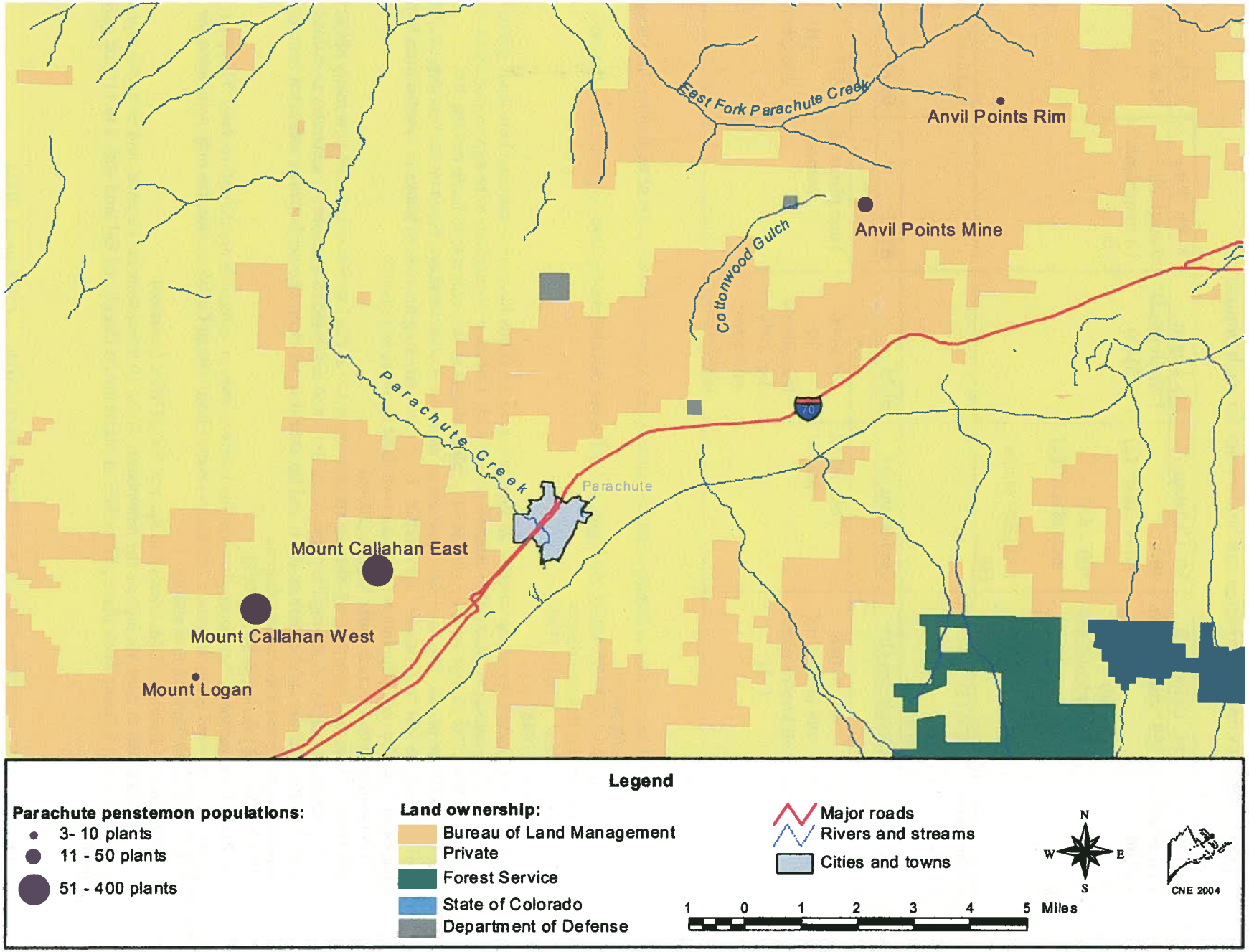


Table 1: Plant numbers, rosettes and land owner for each population.

	Mt. Callahan E.	Mt. Callahan W.	Mt. Logan	A. Pts. Rim	A. Pts. Mine
Number of plants	388 "clumps" (1) 300-400 "individuals" (3)	300 "individuals" (2) 300 – 400 "individuals" (3) 19 to 300 plants (4)	3 "individuals" (3) (5) (6)	0 originals + 10 transplants (7)	31 to 43 (8)
Number of rosettes	6276 (1) no est.				500 to 700 (9)
Owner	Occidental Oil	Occidental Oil	BLM	BLM	BLM
Total private plants:	407 to 688 ~90 to 96 % of all known plants (10)	Total BLM plants:	34 to 46 + 10 transplants ~4 to 10% of all known plants (10)	Total plants all owners:	438 to 731 + 10 transplants

REFERENCES

The most recent survey data is displayed unless survey years were within two years of each other, then results of both surveys are shown.

(1) Spackman *et al.*, CNHP (1997); this figure is used in our calculations because it appears to be the most accurate count for this population.

(2) Spackman *et al.*, CNHP, (1997).

(3) McMullen (1998) at 17.

(4) There is no record regarding whether an attempt was made at this location to estimate how many plants the 300 individuals belong to; McMullen estimates the two Mt. Callahan populations to be approximately the same size (300-400); 388 clumps were counted at Mt. Callahan East so this seems to indicate that the 300 "individuals" are plants. We have also provided an estimate of plant numbers, based on the best data available, that assumes the 300 "individuals" are rosettes. It was derived using the ratio of plants to rosettes from Mount Callahan East, the only population for which both these numbers is available.

(5) Personal communication Carla Scheck (2004a)

(6) There is no record regarding whether an attempt was made at this location to estimate how many plants the 3 individuals belong to. Applying the plants to rosettes ratio discussed in footnote (4) generates an estimate of 2 plants. Because the numbers are so close, and because it is not clear whether botanists estimated there to be 3 plants here, we use 3 in our calculations.

(7) U.S. Dep. of Interior, Scheck (2002).

(8) There is no recorded number of plants at this location, only an estimated number of rosettes. This plant number was derived using the ratio of plants to rosettes from Mount Callahan East, the only population for which both these numbers is available.

(9) U.S. Dep. of Interior, BLM, Glenwood Springs Field Office (undated)

(10) This calculation does not include the transplants. If the 10 transplants are counted, and using the highest estimate for Anvil Points Mine plants, 89 to 94% of plants are on Occidental Oil land with 6 to 11% on public lands.

between contiguous years, which may occur with Parachute penstemon making it difficult to capture population trends.

The descriptions that follow are intended to give an overview of each population. The Colorado Natural Heritage Program Element Occurrence Record identifiers are provided for reference. More detailed assessments of specific threats to each population are provided in § VII below.

A. Mount Callahan East (CNHP EOR #001)

Two populations exist on Mount Callahan, both on private land owned by Occidental Oil.[7] One of these, Mount Callahan East, is the population that the species was first described from in a paper entitled "*Penstemon debilis* (Scrophulariaceae): A new species from Colorado endemic to oil shale." O'Kane and Anderson (1987). The last survey of this population on record with CNHP occurred in July of 1996.

This remains the population with the largest number of plants. It has been widely recognized as the most important population for the survival of the plant. For example, botanists have stated that "[t]his is by far the highest quality occurrence of *Penstemon debilis* known and is a top priority for conservation." Spackman *et al.*, CNHP (1997) (internal citation omitted). *See also* NatureServe (2003) (stating that this population is "the most crucial for the survival of the species and should be focused on first.") Spackman *et al.*, CNHP (1997) put the two Mount Callahan populations, which they combined into one site, first on their priority list for the implementation of conservation actions. Discussion and Recommendations. Both this 1996 statement and the 1997 report pre-dated the first observation in 1997 of the important Anvil Points Mine population on BLM land; however these populations are all clearly of extremely high conservation importance for this highly imperiled plant.

1. Location

This is the most northeastern population of the western complex. It is located on the southern escarpment of Mount Callahan, above the town of Parachute, where Mount Callahan forms part of the Roan Cliffs.

2. Habitat

These plants are found on the Parachute Creek Member of the Green River Formation, on steep, white shale talus, at an elevation of 2,500 meters (8,200 feet). O'Kane and Anderson 1987. Soil is a mixture of thin shale fragments and clay. *Id.*

[7] O'Kane (1988) refers to this as one of "two subpopulations on Mt. Callahan."

3. Population description and status

This population was first observed in 1986 and the last recorded observation in the CNHP database is from 1996. This population has been noted as the highest quality population of the five known. CNHP, EOR (2003); NatureServe (2003). The later discovery of the BLM Anvil Points Mine population in 1997 adds another important population; both are undoubtedly critical for the species.

It is reported that in 1986, at the time this population and the species were discovered, there were "thousands of plants" at this site. CNHP, EOR (2003). In the paper describing the species, this population was reported as having a total areal extent of 90 hectares (220 acres). O'Kane and Anderson (1987). In 1996, surveyors found 388 clumps and 6276 rosettes. CNHP, EOR (2003). This 1996 survey found that of the adult plants, 40% were flowering and 60% were fruiting. *Id.* McMullen (1998) describes this population as containing "approximately 300-400 individuals." At 17. The difference in plant number estimates between 1986 and the late-1990's may or may not represent a decline in plant numbers; at the time of the plant's discovery when botanists estimated "thousands of plants," they may have been estimating rosettes not plants.

Nowhere else has anything close to 6,000 rosettes been observed. There is no recorded survey data since 1996, so current population numbers are unknown, but this likely remains the most substantial known population.

4. Ownership

This population is completely located on land owned by Occidental Oil.

5. Management direction

No regulatory protection is in place for this population, despite it being one of the most critical populations for the plant's survival. Private oil shale mining will likely be the dominant use should the market, tax incentives or technology make this economically attractive again. Traditional natural gas and/or oil drilling is currently occurring in multiple adjacent sections and is another likely use of this land. Colorado Oil and Gas Conservation Commission, Database, (visited Jan. 6, 2004) http://oil-gas.state.co.us.

The Colorado Natural Areas Program ("CNAP") coordinates voluntary natural area protection throughout Colorado. In 1987, the Colorado Natural Areas Council and Occidental Oil Shale, Inc. signed an agreement that designated 360 acres at the top of Mount Callahan, including much of the Mount Callahan East population, as a Colorado Natural Area. CNAP (1987). The Mount Callahan Natural Area is identified for the attributes "Plant Community" and "Special Status Plants." CNAP (1996). Four rare plants are noted in the 1987 agreement, along with a "new species of Penstemon [that] was discovered on the property in 1986" that would soon be described in the scientific literature as *Penstemon debilis.*

Among other provisions, the Articles of Designation for the Mount Callahan Natural Area specify no surface occupancy for oil and gas leasing, and no grazing by domestic stock (CNAP, 1987), though grazing is reported to occur on the site which, if true, calls into question the strength of the agreement. An oil shale production facility located "contiguous" to the Natural Area is permitted to be used as an "oil shale research site, including operation of commercial site demonstration in site (sic) or surface retorts." *Id.*

While the CNAP effort is to be commended, the program fails to ensure protection for this subpopulation in two central ways. First, the Natural Area appears to not include all of the Mount Callahan East population (a portion of the population is apparently located in a section other than the one that contains the Natural Area). Second, the conservation vehicle is a "CNAP Designated: Voluntary Conservation Agreement" (CNAP, 1996), which means that any conservation protections are strictly voluntary on the part of the landowner. The CNAP web page explains that "CNAP does not purchase property; *all agreements are voluntary and non-binding.*" CNAP website, *About Us* (visited Feb. 21, 2003) http://parks.state.co.us/cnap/Generalinfo.html (emphasis added).

The fact that any protections are "strictly voluntary" means that they could be abandoned at any time. The Articles of Designation allow for either party to terminate the Agreement provided it notifies the other party 90 days in advance and gives that party an opportunity to confer. CNAP (1987). If oil shale mining becomes economically advantageous, conventional oil and gas drilling become attractive, or the land is sold to another party, the Natural Area protections could disappear. While such voluntary protection is commendable, it is well established that voluntary habitat protections cannot provide the basis for a decision not to list a species under the ESA. *Oregon Natural Resources Council v. Daley,* 6 F.Supp.2d 1139 (D. Or. 1998) (National Marine Fisheries Service acted contrary to the evidence in deciding not to list Oregon coho salmon and improperly based its decision on future and voluntary habitat protection and restoration actions.)

The Service notes in its 2002 Candidate and Listing Priority Assignment Form for Parachute penstemon that "[t]he Nature Conservancy has attempted, without success, to negotiate with Occidental Oil for protective status for occupied habitat" and that "[n]egotiations have been suspended due to lack of progress." U.S. Dep. of Interior, Fish and Wildlife Service ("FWS") (2002). The Service does not provide dates regarding when these negotiations were suspended, so it is not clear whether this comment reflects the current status.

Specific management actions occurring or expected to occur pursuant to this management direction and impacting this population are discussed under the ESA listing factor "present or threatened destruction, modification, or curtailment of the species' habitat or range" (16 U.S.C. 1533 § (a)(1)(A)) in § VII(A) below.

6. Conservation status

Mount Callahan East, with over 6000 rosettes and approximately 400 plants, is perhaps the most critical population for the conservation of this species. Located entirely on private oil

company land, part of the population is without any protective mechanism, and the remainder is found within a totally voluntary Colorado Natural Area that could be abandoned at any time by the land owner or the state. There is no enforceable regulatory protection in place for these plants.

B. Mount Callahan West (CNHP EOR #003)

The Mount Callahan West population is not within the Mount Callahan Natural Area. It consists of approximately 300 individuals. Spackman *et al.*, CNHP (1997) put the two Mount Callahan populations, which they combined into one site, first on their priority list for the implementation of conservation actions. Discussion and Recommendations. The 1997 report pre-dated the first observation in 1997 of the important Anvil Points Mine population on BLM land; however these populations are all clearly of extremely high conservation importance for this highly imperiled plant.

1. Location

This population is located within one to two miles to the southeast of Mount Callahan East, and less than two miles to the northeast of Mount Logan. It is the center population of the western complex.

2. Habitat

The habitat of these plants is reported as a steep (10-45%), south-facing slope of the Parachute Creek Member of the Green River Formation, with an elevation of 2,518 to 2,548 meters (8,260 to 8,360 feet). CNHP, EOR (2003). The reported substrate is white to brownish-orange shale in small pieces. *Id.*

3. Population description and status

In 1996, approximately 300 individuals were found in this population. CNHP, EOR (2003). At the time of this survey, 40% of the adults were in flower and 60% were in fruit. *Id.* Similarly, McMullen (1998) reported this population as consisting of approximately 300-400 individuals. At 17. Such a small number of plants increases the extirpation risk for this population.

There is no record regarding whether an attempt was made at this location to estimate how many plants the 300 individuals belong to; McMullen (1998) estimates the two Mt. Callahan populations to be approximately the same size (300-400); 388 clumps were counted at Mt. Callahan East (CNHP, EOR, 2003), so this seems to indicate that there are 300 plants here. If we assume instead that the 300 individuals are rosettes and not plants, we calculate a rough estimate of 19 plants, based on the best data available. We derived the number using the ratio of plants to rosettes from Mount Callahan East, the only population for which both these numbers is available.

4. Ownership

This population is completely located on land owned by Occidental Oil.

5. Management direction

There are no regulatory protections or special management provisions for the protection of this population. This population is not within the Mount Callahan Natural Area. Private oil shale mining will likely be the dominant use should the market, tax incentives or technology make this economically attractive again. Traditional natural gas and/or oil drilling is currently occurring in an adjacent section and is another likely use of this land. Colorado Oil and Gas Conservation Commission, Database, (visited Jan. 6, 2004) http://oil-gas.state.co.us.

Specific management actions occurring or expected to occur pursuant to this management direction and impacting this population are discussed under the ESA listing factor "present or threatened destruction, modification, or curtailment of the species' habitat or range" (16 U.S.C. 1533 § (a)(1)(A)) in § VII(A) below.

6. Conservation status

Mount Callahan West, an approximately 300-plant population, already at-risk of extirpation due to low numbers, is found entirely on land owned by an oil company. There is no enforceable regulatory protection in place for these plants.

C. Mount Logan (CNHP EOR #004)

This population is located on BLM land. It is the only population in the western complex that is located on public land. First observed as ten to twenty plants in July 1996, surveys conducted from 1997 to 2003 have found only three individuals. Spackman *et al.*, CNHP (1997) put the Mount Logan population third (out of three) on their priority list for the implementation of conservation actions. Discussion and Recommendations.

1. Location

These plants are located on the slopes of Mount Logan, which is around five miles to the southwest of Mount Callahan, along the cliffs of the Roan Plateau. It is the most southwestern population of the five known, and is part of the western complex.

2. Habitat

These plants are found in atypical habitat. Botanists report that they are located in a road cut which exposed white shale on a northwest-facing slope. CNHP, EOR (2003). The plants were found at an elevation of approximately 2377 meters (7800 feet). *Id.*

3. Population description and status

Ten to twenty individuals were seen in 1996; one of these was very large, measuring approximately twelve inches across with many flowers. CNHP, EOR (2003). McMullen (1998) reports this population as three individuals based on field work performed in 1997 and 1998. This low number was also observed in the summer of 2003, when BLM botanists observed three individuals, including the large plant noted in a the 1996 survey reported above. Pers. comm. Carla Scheck (2004a).

4. Ownership

The BLM Glenwood Springs Field Office administers this land.

5. Management direction

This population falls within the area addressed by the 1999 Glenwood Springs Field Office's Record of Decision ("ROD") and Resource Management Plan Amendment ("RMPA") for Oil and Gas Leasing and Development. U.S. Dep. of Interior, BLM, Glenwood Springs Resource Area ("GSRA") (1999a, b).[8] It is also covered by the 1984 Glenwood Springs Field Office's ROD and RMP (revised in 1988), though the oil and gas leasing provisions of that plan have been superceded by the 1999 RMPA. U.S. Dep. of Interior, BLM, GSRA (1984a, b). This population does not fall within the planning area for the widely publicized plan being prepared for a portion of the Roan Plateau (*see* § (E)(5) below for details).

One of the sections where this population is located is already leased for oil and gas development, and the BLM Resource Management Plan for the area (as amended) that directs management for this population does not adequately protect this plant, as discussed further in § 7 below.

Specific management actions occurring or expected to occur pursuant to this management direction and impacting this population are discussed under the ESA listing factor "present or threatened destruction, modification, or curtailment of the species' habitat or range" (16 U.S.C. 1533 § (a)(1)(A)) in § VII(A) below.

6. Conservation status

With only three individuals observed during the last two surveys (which span a period of five years ending in 2003), this population is clearly at very high-risk of extirpation simply due to its low numbers. For example, a single road maintenance or repair action could completely eliminate this population. This is the only population within the western complex that is found on public lands, while the other two are found on Occidental Oil land. Ensuring its protection should thus be a priority since no enforceable regulatory protections are currently available for

[8] The Glenwood Springs Field Office was referred to as the Glenwood Springs Resource Area when these older plans and plan amendments were written. We use the latter only in the citations for these plans.

the private land populations; however, adequate protection has not yet been provided even on BLM lands.

D. Anvil Points Rim (CNHP EOR #002)

One of the three BLM populations, this was first discovered in 1991 and was surveyed as recently as 2003. It is by far the smaller of the two Anvil Points populations that form the eastern complex. The number of plants found here has steadily decreased since the population was first discovered in 1991. The reason(s) for this decline are unknown. None of the original plants have been seen since before 1997 and it is unlikely that they are still alive below ground, though ten off-site transplants were persisting here as of 2002.

Spackman *et al.*, CNHP (1997) put this population second on their priority list for the implementation of conservation actions. Discussion and Recommendations. The 1997 report pre-dated the first observation in 1997 of the important Anvil Points Mine population on BLM land; however both are clearly of high conservation importance for this highly imperiled plant.

1. Location

This is population is found on the south slope of the Roan Cliffs, northwest of Rifle, Colorado. CNHP, EOR (2003). This is the most northeastern population of the five known. It is one of two populations found in the eastern complex; the other, Anvil Points Mine (described below), is located less than three miles to the southwest.

2. Habitat

A 1996 survey reports that this population is located on the Parachute Creek Member of the Green River Formation, on a slope of approximately 30%. CNHP, EOR (2003). A 1997 survey similarly estimated the slope where plants were found to be 45%. CNHP, EOR (2003). Both surveys report the slopes as south-facing. The habitat is composed of platy, unstable shale. *Id.* Plants were found on barren outcrops of shale, tan to grey to white and broken in small fragments (<5cm. across), mixed with lots of silt- to clay-sized particles. *Id.* The elevation where these plants were found ranged from 2,755 to 2,768 meters (9,040 to 9,080 feet). *Id.*

3. Population description and status

The BLM, in its "Report on the Status and Trends of the Anvil Point Rim Penstemon Debilis Site," reports that no plants from the original population here have been seen since before 1999. U.S. Dep. of Interior, Scheck (2002) ("BLM Anvil Points Rim Report"). However, as of 2002, only ten plants survived here out of 53 transplanted in 1998 from seedlings raised from Mount Callahan seed. *Id.*

In 1991, when this population was first discovered, no official census was taken but the population size was estimated to be "hundreds of plants." U.S. Dep. of Interior, Scheck (2002) (internal citation omitted). In September of 1995, botanists found only approximately 25 plants.

CNHP, EOR (2003). By 1996, just twelve plants were located during a one hour search of the area by four people, with all twelve located within a 20 by 20 meter area. *Id.* The BLM Anvil Points Rim Report states that only three extant individuals were counted by BLM ecologist Carla Scheck in 1997 and in 1998. U.S. Dep. of Interior, Scheck (2002).

The BLM Anvil Points Rim Report explains that in 1998, with only three individuals remaining, the original population was no longer considered viable. At this time, 53 greenhouse-raised Parachute penstemon seedlings were transplanted near this population. *Id.* Survey work by BLM in 1999, 2000, and 2001(*id.*) and 2003 (pers. comm. Carla Scheck, 2004a) failed to locate any individuals of the original population. Since no plants from the original population have been seen since before 1999, it appears unlikely – though possible – that they are persisting underground.

The transplants had been raised from seed taken from the Mount Callahan East population. McMullen (1998). Planting was done approximately 50 feet away from the original plants so that subsequent monitoring could easily distinguish the original plants from the transplants. U.S. Dep. of Interior, Scheck (2002). Only ten of the transplanted plants were alive in 2002 (*id.*), and it may be that only five of those will persist. Pers. comm. Carla Scheck (2004a). When examined in 2002, all transplants appeared to be "very weak and diminutive," and nine out of the ten did not appear any larger in above-ground vegetative growth than when first transplanted. U.S. Dep. of Interior, Scheck (2002).

The cause of the declines seen in the original population and the transplants is unknown. After describing the natural disturbance dynamics at the known Parachute penstemon sites, McMullen (1998) notes the possibility that the decline of this population "may be a result of a reduction in the disturbance levels through successional processes such as soil development and increased vegetative cover." At 73. This theory remains unconfirmed and warrants further study, although McMullen reports that all five populations are found on slopes greater than 45%, and as high as 67%, which would seem to inhibit soil stabilization. At. 79. McMullen notes that "[m]onitoring long-term population fluctuations and persistence would provide useful data in our attempt to understand the population dynamics and endemism of this interesting plant." *Id.*

As noted above, genetic work conducted on Parachute penstemon indicates that the western and eastern complexes are significantly differentiated. Pers. comm. Dr. Wolfe (2004a). Even if the Mount Callahan transplants survive at the location of the former Anvil Points Rim population, significant genetic diversity may have been irretrievably lost through the extirpation of the original Anvil Points Rim population. For a species with only five known populations, the loss of one of these five significantly increases the likelihood of extinction.

It is unknown whether any plants will persist at this location. The surviving few transplants could be building up root mass underground and could become reproducing plants, or they may ultimately die out. U.S. Dep. of Interior, Scheck (2002). Since no plants from the original population have been seen since before 1999, it is unlikely that they are persisting underground. Thus the original population here, which was genetically different from the transplants, appears to have been eliminated.

4. Ownership

The BLM Glenwood Springs Field Office administers this land. This land was previously held by the U.S. Department of Energy ("DOE") as the Naval Oil Shale Reserve, and was transferred to the BLM in 1998 by an act of Congress. Public Law 105-85, Department of Defense Authorization Act of 1998.

5. Management direction

The area where this population is located is not currently covered by any BLM plan. The Glenwood Springs Field Office's 1999 ROD and RMPA for Oil and Gas Leasing and Development only addressed a specific portion of the former Naval Oil Shale Reserve referred to as the Production Area, which this population is not within.[9] U.S. Dep. of Interior, BLM, GSRA (1999b) at 1.

The BLM Glenwood Springs Field Office is preparing a draft Resource Management Plan Amendment for a portion of the Roan Plateau ("Roan draft plan"), which will cover this population. The planning area includes only the eastern portion of the Roan Plateau, and includes the former Naval Oil Shale Reserve that was transferred to BLM in 1998. Approximately 73,600 acres of BLM land are within the planning area (U.S. Dep. of Interior, BLM, undated), 18,000 acres of which are already leased for oil or gas development. Dennis Webb, *Drilling on top of Roan Plateau not necessary*, Glenwood Springs Post Independent (Jan. 8, 2004).

Current federal policy for the Piceance Basin generally, and the Roan Plateau specifically, includes massively increased drilling for natural gas on public lands. *See e.g.* Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the lat energy boom. Will this one destroy it?* Westword (Jan. 1, 2004). This portion of the Roan to be addressed in the upcoming draft plan is reportedly "on a national list of 21 high-priority BLM properties slated for expedited management plans because . . .the plateau happens to sit on top of an estimated 7 trillion cubic feet of natural gas." *Id.* The Roan draft plan is widely reported to include dramatic increases of energy development, including drilling on top of the plateau. Release of the plan has been delayed several times. Gargi Chakrabary, *Roan gas-drilling hits a plateau: public scrutiny prompts new look in Washington*, Rocky Mountain News (Feb. 13, 2004).

Specific management actions occurring or expected to occur pursuant to this management direction and impacting this population are discussed under the ESA listing factor "present or

[9] At one point, the Final Supplemental Environmental Impact Statement ("FSEIS") that supports the RMPA indicates that this area was included in the SEIS study area. U.S. Dep. of Interior, BLM, GSRA (1999c) at 1-4 (The BLM "decided to include all the lands below the rim of the south aspect of the Roan Cliffs in the SEIS study area.") However, this is not supported by the RMPA language itself which states that of the Naval Oil Shale Reserve, only the Production Area was included in the plan. *Id.* at 1.

threatened destruction, modification, or curtailment of the species' habitat or range" (16 U.S.C. 1533 § (a)(1)(A)) in § VII(A) below.

6. Conservation status

Since no plants from the original population have been seen since before 1999, the original population, which was genetically distinct from the few surviving transplants, may have been eliminated. The cause of the declines of the original population and of the transplants is unknown.

E. Anvil Points Mine (CNHP EOR #005)

First observed in September, 1997, this is by far the largest of the three populations found on public land. It is considered a critical population for the conservation and recovery of the species. U.S. Dep. of Interior, BLM, Glenwood Springs Field Office ("GSFO") (undated). The last survey recorded by CNHP occurred in July of 1998.

1. Location

This is one of two populations in the eastern cliff complex. It is found on the south slope of the Roan Cliffs near the Anvil Points Mines, nearly due west of Rifle, Colorado in a ¼ mile by 80 foot wide band. CNHP, EOR (2003).

2. Habitat

Located on southeast-facing, 40-50% convex talus slope of the Green River Formation, from kerogenous marlstone (Mahogany Zone) parent material. CNHP, EOR (2003). Plants were found on benches above the adits (nearly horizontal passages from the surface of a mine), on scree below the adits, and along an abandoned road bed. *Id.* Cover is reported as follows: total tree (0%); total shrub (1-2%); total forb (2-3%); total graminoid (1%); moss/lichen (0%); total bare ground cover (95%). *Id.* The elevation of this population ranges from 2,463 to 2,560 meters (8,080 to 8,400 feet). *Id.*

3. Population description and status

BLM reports that this population appears to be stable with an estimated 500-700 individuals, but that "[i]t has not been determined whether these 500+ rosettes are separate individuals or whether many of them are connected via underground rhizomes." U.S. Dep. of Interior, BLM, GSFO (undated). The 500 to 700 rosettes were estimated during a BLM survey of the area in 2000 and 2001. Pers. comm. Carla Scheck (2004b).

Similarly, 300 to over 500 individuals in a ¼ mile by 80 foot wide band were seen in 1997. CNHP, EOR (2003). In 1998, 30 plants were seen in a quick survey; most of these plants were fruiting and a few had flowers. *Id.* The decrease in plants observed between these two

years likely reflects the short time spent on the 1998 survey and not a decrease in plant numbers. Pers. comm. Carla Scheck (2004a).

Using the BLM's estimate of 500 to 700 rosettes at this site multiplied by the ratio of plants to rosettes at the Mount Callahan East population, the only site for which both these numbers are available, we arrive at a rough estimate of 31 to 43 plants for this population.

4. Ownership

As with Anvil Points Rim, the land where this population is located is part of the former Naval Oil Shale Reserve that was transferred from the DOE to the BLM in 1998 by an act of Congress. Public Law 105-85, Department of Defense Authorization Act for 1998. The BLM Glenwood Springs Field Office currently administers this area.

5. Management direction

Like Anvil Points Rim, this population is located on the former Naval Oil Shale Reserve and is not currently covered by any BLM plan because it is outside the area addressed by the Glenwood Springs Field Office's 1999 ROD and RMPA for Oil and Gas Leasing and Development. U.S. Dep. of Interior, BLM, GSRA (1999b) at 1. This population falls within the area to be addressed by the upcoming Roan draft plan that is widely expected to call for massively accelerated energy development in the area.

Specific management actions occurring or expected to occur pursuant to this management direction and impacting this population are discussed under the ESA listing factor "present or threatened destruction, modification, or curtailment of the species' habitat or range" (16 U.S.C. 1533 § (a)(1)(A)) in § VII(A) below.

6. Conservation status

With 500 to 700 rosettes this is by far the largest of the three populations found on public land (one of the others consists of only three individuals, and the other of zero original plants and ten or fewer transplants). This is considered a critical population for the conservation and recovery of the species. U.S. Dep. of Interior, BLM, GSFO (undated). However, even basic conservation measures, such as closing the road adjacent to the population, have not been taken by BLM. Additionally, the population is within the Roan Plateau planning area and thus will be covered by the soon to be released Roan draft plan, which is widely expected to facilitate massively increased oil and gas development of this area. Without substantially improved protections, this population is at great risk from increased development.

V. THE CURRENT LEGAL STATUS AND OTHER DESIGNATIONS FOR PARACHUTE PENSTEMON INDICATE THAT LISTING IS WARRANTED

A. Federal ESA: Parachute penstemon is an ESA candidate species that meets the criteria for a proposal to list and whose listing priority is high under current circumstances

Parachute penstemon is a candidate species under the ESA with a high listing priority that should be even higher under current circumstances. Candidate status is ineffective to protect the species, and scientists who have studied the plant have recommended its listing for years. Thus the Secretary should list Parachute penstemon as threatened or endangered.

i) The Service already recognizes that Parachute penstemon should be proposed for listing

Parachute penstemon was first listed by the Service under the ESA as a category 2 candidate species in 1990. 55 Fed. Reg. 6184, 6217 (Feb. 21, 1990) (Review of plant taxa for listing as endangered or threatened species) (commonly referred to as a Candidate Notice of Review, or "CNOR"). Category 2 candidate species, a designation which no longer exists, were defined as "[t]axa for which information now in the possession of the Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which sufficient data on biological vulnerability and threat are not currently available to support proposed rules." 58 Fed. Reg. 51144, 51145 (Sept. 30, 1993) (Review of plant taxa for listing as endangered or threatened species).

In 1996, the Service abandoned the category 2 designation and renamed the former category 1 as simply "candidate," eliminating candidate status for most category 2 candidate species. 61 Fed. Reg. 7596, 7597 (Feb. 28, 1996) (Review of plant and animal taxa that are candidates for listing as endangered or threatened species). However, instead of eliminating candidate status for Parachute penstemon, the Service changed its status to the new higher candidate status (formerly category 1). *Id.* at 7606. The Service defined the new candidate category as one for "those species for which the Service has on file sufficient information on biological vulnerability and threat[s] to support issuance of a proposed rule to list but issuance of the proposed rule is precluded." *Id.* at 7597.

Four CNOR lists have been published since 1996 and Parachute penstemon has remained a candidate species with a listing priority of five on each. 62 Fed. Reg. 4937, 49407 (Sept. 19, 1997); 64 Fed. Reg. 57533, 557543 (Oct. 25, 1999); 66 Fed. Reg. 54807, 54829 (Oct. 30, 2001); 67 Fed. Reg. 40657, 40677 (June 13, 2002). A candidate species continues to be defined substantially the same as in 1996: "one for which [the Service has] on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened but for which preparation and publication of a proposal is precluded by higher priority listing actions." 67 Fed. Reg. 40657, 40658 (June 13, 2002) (Review of Species that are candidates or proposed for listing as endangered or threatened).

The candidate status of Parachute penstemon is significant because it means that the Service itself clearly recognizes and has documented that this species should be proposed for listing. The Service has recognized this since at least 1996. The candidate status of Parachute penstemon also means that the Service itself should be proposing this species as threatened or endangered under the ESA.

ii) Because Parachute penstemon faces imminent threats, its listing priority should be the highest available for a species

A listing priority number is computed for each species on the candidate list. This listing priority number is computed using a matrix that takes into account the "Magnitude" and the "Immediacy" of the "Threat," as well as the "Taxonomy" of the plant or animal. U.S. Dep. of Interior, FWS (2002). There are twelve possible listing priority numbers, with one being the highest and twelve the lowest (though one is reserved for a "monotypic genus" and two is the highest for a "species" such as Parachute penstemon).

Since the adoption of the listing priority system in 1996 (61 Fed. Reg. 7595) (Feb. 28, 1996), Parachute penstemon has been assigned a listing priority number of five. The matrix on the Candidate Listing Priority and Assignment Form ("CLPA Form") completed in 2002 for Parachute penstemon shows how this number was chosen. Because the Threat was classified as Non-Imminent, while the Magnitude of the Threat ("destruction of its habitat for oil shale production *or other energy development*") was classified as High, the number arrived at was 5. U.S. Dep. of Interior, FWS (2002) (emphasis added). However, the CLPA Form states that "[t]he level of threat will change from non-imminent to imminent if mining is initiated in the habitat." It points out that the "economic climate could change at any time" making oil shale and/or energy development financially viable.

Importantly, the CLPA Form warns that "[i]f the Fish and Wildlife Service waits until increased mining activity takes place or until the land passes into private ownership, the species will likely be extirpated." While the reference to passing the land into private hands is outdated because the land referred to is the now former Naval Oil Shale Reserve that was transferred to the BLM in 1998, not into private ownership, the message is clear that increased surface-disturbing activity will likely extirpate the Parachute penstemon.

The CLPA Form is clearly out date with regards to the Imminence of the "energy development" and "increased mining activity" that clearly concerned the Service.[10] These threats are now unquestionably "Imminent" in the habitat of the Parachute penstemon (*see* § V(A)(1) below for a full discussion). Given this Imminence, the Listing Priority matrix should yield a new number of two – the highest listing priority that can be assigned to a species.

[10] The fact that the CLPA Form is out of date is unquestionable. The information appears to be current as of about 1997 (for example, it states that "[t]he property was recently surveyed for rare species in preparation for changes in ownership and management" but this survey would be Rondeau *et al.* (1997)). Similarly, the CLPA Form incorrectly reports on only two occurrences, when now there are the still alarmingly few five known.

The Service has not yet published its 2003 review of candidate species which is the appropriate vehicle for adjusting the listing priority number based on the current levels and projected acceleration of energy development within the plant's range. Given the delays in publishing these reviews, it is clear that they cannot be relied on to guide the Service in its listing decisions when activities on the ground occur quickly by comparison.

In summary, since 1996 the Service has recognized Parachute penstemon as a species for which it has on file sufficient information to support issuance of a listing proposal. The Service assigned Parachute penstemon a high listing priority number from the beginning, though this number should be increased now due to the imminent threat of energy development. The Federal Register notices and the 2002 CLPA Form cited above clearly show that Parachute penstemon should be listed as threatened or endangered under the ESA.

iii) Candidate status is ineffective at protecting Parachute penstemon

Despite its candidate status, the CLPA Form reports that "Parachute [penstemon] has little or no Federal regulatory protection at either of its two known locations." The two locations referred to here were the private Mount Callahan East and the BLM Anvil Points Rim populations. The Service's assessment of the lack of federal regulatory protection at these two populations is just as accurate with regards to the other three more recently discovered populations.

With regards to management of the Occidental Oil lands where two populations are located, candidate status has no legal effect whatsoever. No protection at all results from a plant's candidate status when the plant is located on private lands.

With respect to the three populations on BLM lands, the BLM Manual dictates that certain steps be taken regarding candidate species. The overarching goal is that "*[c]onsistent with existing laws*, the BLM shall implement management plans that conserve candidate species and their habitats and shall ensure that actions authorized, funded, or carried out by BLM do not contribute to the need for the species to become listed." BLM Manual § 6840.06(C) (emphasis added).

A key shortfall of this provision for Parachute penstemon is the position of the Glenwood Spring Field Office that it is "obligated by law and committed through previous land use planning decision to make public lands available for oil and gas development" and that "providing such opportunities is an important element of BLM's multiple-use mission." U.S. Dep. of Interior, BLM, GSRA (1999c) at 1-8. Thus as the Glenwood Springs Field Office appears to be interpreting these BLM Manual provisions, it is only committing to protect candidate species if doing so does not interfere with the legal obligation that it believes it has to develop public lands for oil and gas; obviously, this is an inadequate level of protection and much less protective than the ESA requires for threatened or endangered species.

The BLM Manual also directs BLM to take certain specific actions with regards to candidate species (BLM Manual § 6840.06(C)), but it is not clear whether or to what extent even

these actions have been or are being taken. For example, the BLM Manual directs BLM to conserve candidate species by "[d]eveloping, cooperating with, and implementing rangewide and or site-specific management plans, conservation strategies, and assessments for candidate species that include specific habitat and population management objectives designed for conservation, as well as management strategies necessary to meet those objectives." *Id.* While BLM ecologist Carla Scheck has done considerable monitoring of the plants and identified important conservation actions that could be taken (*see* U.S. Dep. of Interior, BLM, GSFO, undated), BLM planning and protection efforts for this plant do not live up to the direction in the BLM Manual. For example, petitioners requested but could not find a conservation plan for this plant, and even obvious conservation measures, such as closing the road through the Anvil Points Mine population, have not been taken.

The BLM Manual also requires the BLM to "[e]nsur[e] candidate species are appropriately considered in land use plans." *Id.* The current management scenarios for the three BLM populations indicate that this has not adequately occurred for Parachute penstemon. For example, in the now current Glenwood Springs Field Office's 1999 RMPA for Oil and Gas Leasing and Development, the No Surface Occupancy stipulation applicable to candidate species appears inadequate and easily waived (*see* Section (VIII)(A)(1)(b)(ii) below for a full discussion). Similarly, although the unreleased Roan draft plan apparently considered a proposal for a protective Area of Critical Environmental Concern around one of the Anvil Points populations, this proposal is widely rumored to have been dropped from the Preferred Alternative. Additionally, it should be noted that Parachute penstemon is not designated as a Sensitive Species by the BLM, though it certainly meets the criteria.

iv) Scientists who have studied Parachute penstemon have urged its protection, including listing

In 1988, Dr. Steve O'Kane, who discovered Parachute penstemon wrote that "[b]ecause of extreme rarity, *P. debilis* should be listed as an endangered species." O'Kane (1988). Dr. Wolfe, who conducted genetic analysis of plant, also believes that the plant is in danger of extinction unless some conservation measures are taken to preserve the habitat. Pers. comm. Dr. Wolfe (2004a).

Dr. O'Kane's recommendation that the plant be listed was echoed by scientists who prepared a detailed field-oriented study of the plant and its management needs. Spackman *et al.*, CNHP (1997). In conclusion, they suggested 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." *Id.*, Abstract. Seven years have passed since this recommendation was made, and no such conservation actions have been taken. The views of all of these scientists who have studied the plant should be taken seriously by the Service.

v) Summary: Parachute penstemon is a species that warrants immediate listing

The Secretary and the Service must not fail Parachute penstemon, nor fail to meet their duties under the ESA, by allowing this plant to become extinct, a risk that increases with every passing month in the absence of ESA protection. Instead the Secretary must list this species as either threatened or endangered, and the Service must ensure appropriate protection.

B. Natural Heritage Program: Parachute penstemon's ranking indicates the highest level of imperilment

The Natural Heritage Program tracks imperiled species and assigns them non-regulatory ranks that reflect their perceived level of imperilment. The CNHP ranks Parachute penstemon globally as a "G1" and at the sub-national (state or province) level as a "S1." CNHP (2003). These rankings mean that scientists believe that this plant is at the highest level of imperilment with an extreme risk of extinction. If the plant were to be assigned a higher ranking it would indicate extirpation (possible, presumed or definite). NatureServe (2003). CNHP rankings confer no legal status but are an important indicator of the scientific community's knowledge and assessment of the conservation status of a given species. The following definitions for the Parachute penstemon rankings are from NatureServe (2003):

G1: A global rank of G1 is defined as:

> Critically Imperiled – Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or linear miles (<10).

S1: A sub-national (state or province) rank of S1 is defined as:

> Critically Imperiled – Critically imperiled in the nation or subnation because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the subnation. Typically 5 or fewer occurrences or very few remaining individuals.

Parachute penstemon's global and state ranks of Critically Imperiled show that scientists believe the risk of extinction of this species is the highest possible. These rankings strongly indicate that a listing of Parachute penstemon under the ESA is required.

C. Summary of legal and other designations: all point to a high level of concern regarding the conservation of Parachute penstemon

Parachute penstemon's candidate status combined with its CNHP ranks of Critically Imperiled clearly indicate widespread and serious concern about the status and fate of the Parachute penstemon. However they provide, at best, a modicum of protection that is clearly

insufficient to stop declines and recover the species. A candidate species with these Natural Heritage Program rankings is in need of a high level of protection that only the ESA can come close to offering.

VI. THE SERVICE IS REQUIRED TO LIST PARACHUTE PENSTEMON AS THREATENED OR ENDANGERED UNDER THE ESA

The ESA, along with its implementing regulations, requires the appropriate Secretary[11] to determine whether any species is an endangered species or a threatened species because of *any* of five listed factors. 16 U.S.C. 1533 § 4 (a)(1)(A-E); 50 C.F.R. § 424.11(c). In the case of Parachute penstemon, four out the five factors are unequivocally met and the fifth may be met as well.

The ESA states that:

> The Secretary . . . shall determine whether any species is an endangered species or a threatened species because of *any* of the following factors:
>
> (A) The present or threatened destruction, modification, or curtailment of the species' habitat or range
> (B) Overutilization for commercial, recreational, scientific, or educational purposes
> (C) Disease or predation
> (D) Inadequacy of existing regulatory mechanisms
> (E) Other natural or man-made factors affecting the species' continued existence

16 U.S.C. 1533 § 4 (a)(1)(A-E) (emphasis added).

The ESA defines an "endangered species" as "any species which is in danger of extinction throughout all or a significant portion of its range." 16 U.S.C. § 1532(6). A "threatened species" under the ESA is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20).

This section contains an analysis of the five listing factors as applied to the Parachute penstemon, demonstrating that this plant species meets at least four if not all of the five criteria for listing under the ESA. As such, Parachute penstemon clearly merits listing as threatened or endangered.

[11] The Service has responsibility for most terrestrial and inland aquatic species, while the National Marine Fisheries Service is responsible for most marine species.

A. The present or threatened destruction, modification, or curtailment of the species' habitat or range

This factor is unequivocally met and thus establishes that the Service is required to list Parachute penstemon as threatened or endangered. The restriction of Parachute penstemon to a narrow geologic formation that is extraordinarily rich in oil, oil shale, and natural gas, combined with existing and accelerating energy development in the absence of adequate restrictions, threaten severe habitat destruction. The Roan Plateau, where all the populations are located, is experiencing extensive development of natural gas. Part of one of the three BLM populations is within an area that has already been leased. More development, including drilling on top of the Roan Plateau, is expected to be proposed in the Roan draft plan. Energy development has well-documented impacts on plants and plant habitat that are discussed below. In addition, Parachute penstemon and its habitat face threats from oil shale mining, noxious weeds, roads, recreation, grazing, coalbed methane development, and climate change.

1. Traditional oil and gas development poses undeniable and substantial threats to Parachute penstemon

For analytical clarity, we address extraction of oil and gas via traditional drilling methods (along with the necessary infrastructure) under this heading, but address oil shale mining and coalbed methane extraction separately below. The narrow geographic restriction of Parachute penstemon to the Parachute Creek Member of the Green River Formation in the geologically defined Piceance Basin places it at especially great risk of extirpation from the impacts of traditional energy extraction. This is because this specific geological stratum overlays a large deposit of oil and natural gas.

(a) Traditional oil and gas resources and development are extensive within the range of Parachute penstemon

All five populations of Parachute penstemon are located on along the cliff region of the Roan Plateau within the geologically defined Piceance Basin, which overlays large amounts of oil and natural gas. Recent calculations by the U.S. Geological Survey show the Uinta-Piceance Province containing 21 trillion cubic feet of natural gas. U.S. Geological Survey (2003). The BLM projects that just from the portion of the Roan Plateau that will be addressed in the upcoming Roan draft plan, around 3,916 billion cubic feet (or nearly 4 trillion) of natural gas will be developed over the next twenty years, the approximate life of the plan. Citizens' Campaign to Save Roan Plateau, Press Release, 86% of Plateau's natural gas available without drilling top (Jan. 2, 2004; revised Feb. 9, 2004), *citing* BLM's Reasonable Foreseeable Development scenario for the Roan. Available on the web at: http://www.saveroanplateau.org/documents/eightysixpercentrelease1.pdf

Current federal policy for the Piceance Basin generally, and that being proposed for the Roan Plateau specifically, includes massively increased drilling for natural gas on public lands. *See e.g.* Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the last energy boom. Will this one destroy it?* Westword (Jan. 1, 2004). This

increase in energy development places plants such as Parachute penstemon at increased risk from development impacts. As the BLM itself noted over ten years ago, "as oil and gas development continues and well density increases, the potential impacts are magnified." U.S. Dep. of Interior, BLM, GSRA (1999c) at 4-33, 34. See Figures 4 and 5 on the following pages for maps and an aerial photograph showing oil and gas development in the vicinity of Parachute penstemon.

While about half of the Roan Plateau planning area is already leased or owned by the oil and gas industry (Citizens Campaign to Save Roan Plateau, Press Release, Jan. 2, 2004), the public lands portion that will be addressed in the upcoming Roan draft plan is largely unleased because leasing was on-hold pending completion of a BLM plan covering the area. The Roan Plateau planning area is reportedly "on a national list of 21 high-priority BLM properties slated for expedited management plans because . . . the plateau happens to sit on top of an estimated 7 trillion cubic feet of natural gas." Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the last energy boom. Will this one destroy it?* Westword (Jan. 1, 2004).

A set of preliminary alternatives released by the BLM in 2002 has reportedly been abandoned in the unreleased Roan draft plan for a set with far more emphasis on extraction of oil and gas, including drilling on top of the Roan Plateau. Alternative F, the most protective (and most widely supported) preliminary alternative that all but banned drilling on top of the plateau, has reportedly been dropped altogether. *Id.* Although details of the current alternatives are not publicly available, some alternatives reportedly include drilling on top of the plateau and multi-well pads distributed at a densities ranging from one pad per 40 acres to one pad per 160 acres. *Id.* An internal Colorado Division of Wildlife memorandum obtained by the newspaper Westword projects that this development could add up to 170 miles of new road on top of the Roan Plateau, a 70 percent increase in the current road miles. *Id.*

The emphasis on the accelerated development of the oil and gas resources on the Roan Plateau is consistent with the patterns of oil and gas extraction happening elsewhere in Garfield County, across the state of Colorado, and specifically on other BLM lands. Garfield County, where all the Parachute penstemon populations are located, contains more than 1,400 wells "operating at a higher density than anywhere else in the country." *Id.* 400 new wells were permitted in Garfield County in 2003, twice the number permitted in 2001, and 500 are projected for 2004. *Id.* The county leads the nation in its growth of planned well numbers, with 10,000 planned in the next few decades. Pers. comm., Pete Kolbenschlag (2004b). Statewide, the Colorado Oil and Gas Conservation Commission director says that there has been a "sustained drilling boom for three years in a row [in Colorado], but we believe that 2004 will be an all-time record." Gargi Chakrabarty, *It's just like old (boom) time: Colorado set to post record in 2004 for oil, gas well permits*, Rocky Mountain News (Jan. 6, 2004). The Commission forecasts that statewide in 2004 it will issue a record 2,500 permits to drill oil and gas wells. *Id.*

Fig. 4. Parachute penstemon populations and oil and gas and geophysical exploration leases as of July 2001*, and oil and gas wells as of December 2003

*These were the most recent GIS data for leases available to us. LR 2000 data indicate that the southern Mount Logan lease is now closed.

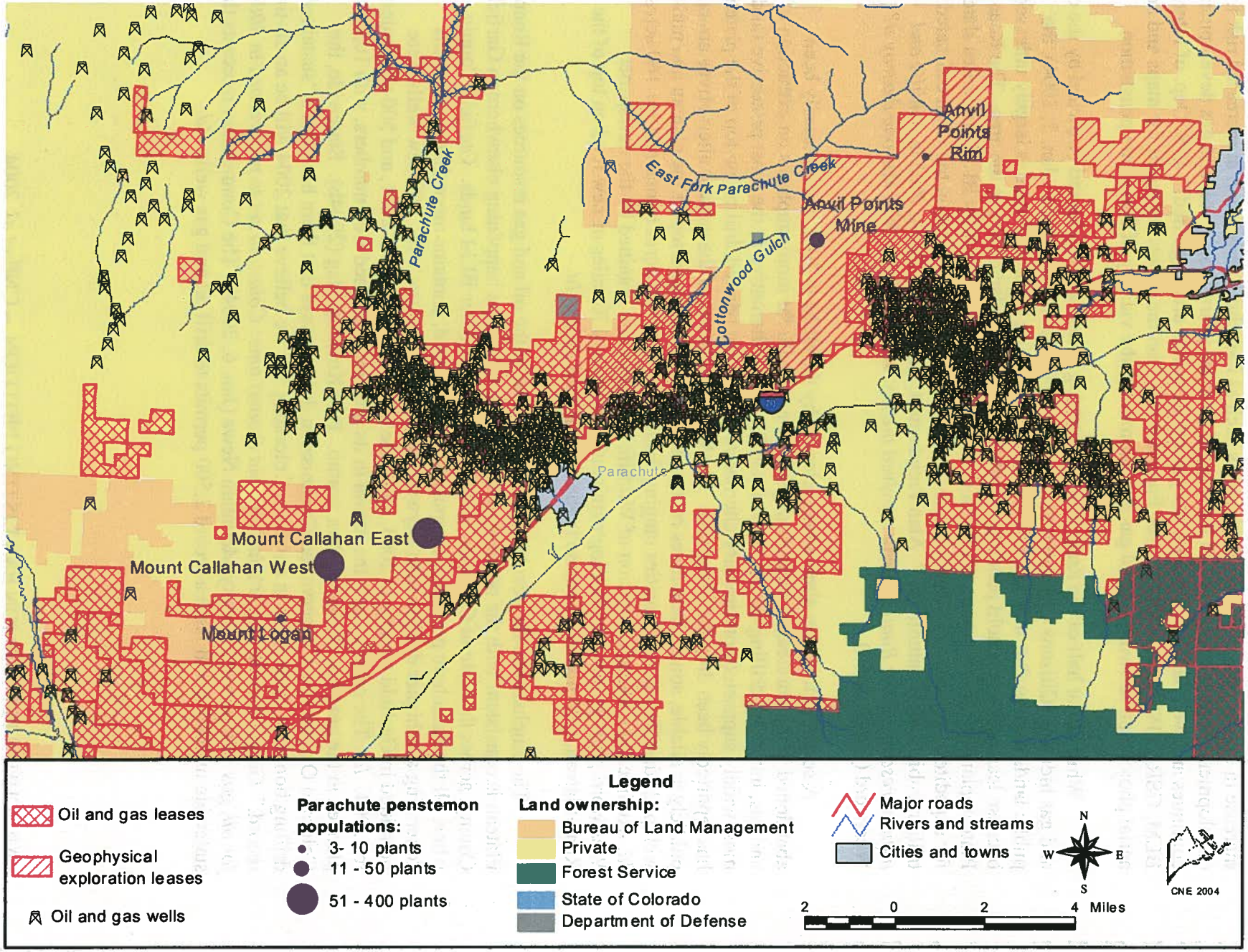


Fig. 5: Aerial photograph of oil and gas development in the vicinity of Parachute penstemon.
Photo by SkyTruth / EcoFlight, copyright 2004.

The National Petroleum Council estimates that within the Rocky Mountain region industry will be able to access 91% of natural gas reserves found on federal lands. National Petroleum Council 2001. It should also be noted that there is a well-advertised effort by the BLM to better serve the oil and gas industry by processing well drilling permits faster. *See e.g.* U.S. Dep. of Interior, BLM website, EFOIA (visited Feb. 22, 2004) http://www.blm.gov/nhp/efoia/wo/fy03/im2003-153.htm (BLM Instructional Memo regarding these efforts "Background: Task #8 of the National Energy Policy Implementation Plan includes the requirement that the Bureau of Land Management (BLM) identify ways to expedite the APD [application for permit to drill] approval process. A team was formed to study the APD process and identify improvements.") Especially given declining federal land management budgets, such fast-tracking of drilling permits is likely to result in extensive impacts to the plant populations that the BLM is charged with protecting.

In summary, all five populations overlay rich oil and gas resources in a county that is operating at a higher well density than anywhere else in the country, and that leads the nation in its growth of planned gas well numbers. The Service should heed its own warning from the CLPA Form and list the Parachute penstemon before it becomes extirpated.

(b) Mechanics of traditional oil and gas development impacts

Threats to plant persistence from traditional energy extraction arise primarily from the construction and use of extensive infrastructure networks (roads, pipelines, well pads, power lines, railroad tracks, waste pits and others) that accompany the development of oil and gas fields. U.S. Dep. of Interior, BLM, GSRA (1999a) at 4-33, 34; The Wilderness Society (2002).

While the amount of road construction needed for each new well pad varies, depending in part on well density, road densities associated with oil and gas development are consistently very high. Recent government estimates from different areas include that approximately one new mile of road is needed for each oil well (U.S. Dep. of Agriculture, Forest Service, Bridger-Teton National Forest, 2000) and 0.4 new miles of road is needed per conventional natural gas well. U.S. Dep. of Interior, BLM, Pinedale Field Office (2000). The Wilderness Society (2002) recently conducted a pilot analysis of the ecological footprint of oil and gas infrastructure in the Big-Piney-LaBarge oil and gas field, located in the Upper Green River Basin in Wyoming and managed primarily by the BLM. The study found, among other things, that the linear infrastructure (pipelines and roads) density was 8.43 miles per square mile.

The Wilderness Society report notes that natural gas reserves that are "tight sands," also called "continuous-type," are classified by the U.S. Geological Survey as unconventional. They further cite the U.S. Geological Survey for the fact that "[e]xploitation of tight sands gas requires drilling a significant number of wells because the distribution of this gas type is not well known." *Id.* (internal citation omitted). This likely means that natural gas development in the Parachute penstemon range will carry high environmental costs from drilling because in the Uinta-Piceance Basin "nearly all the undiscovered gas is unconventional (continuous)." U.S. Geological Survey (2003).

One clear threat from facility construction is the direct destruction of plants and plant habitat. *See* U.S. Dep. of Interior, BLM, GSRA (1999c) at 4-33, 34. For example, in one instance on land previously held by the DOE but now held by the BLM, "the DOE moved a well pad slightly to avoid the highest concentration of [Special Status] plants but did destroy a sizeable number of individuals." *Id.* In another instance, the BLM found that a proposed well pad site would have destroyed "several dozen BLM Sensitive plants." *Id.* However, alternative well pad sites would have required greater cuts and fills, creating more impacts to the drainage, so the well pad was moved only slightly resulting in "avoid[ance] of a clump" of the BLM Sensitive plants, while "a dozen or so were directly impacted by well construction." *Id.*

The extensive ground disturbance caused by the construction and use of the facilities also results in a host of less direct but often devastating impacts. Ground disturbances may introduce noxious weeds (Shuman and Whicker, 1986); eliminate mycorrhizal fungi (Knapp, 1996), and disrupt or eliminate pollinator habitat (especially for ground nesters). Side cast from well pad construction can destroy or damage plant populations even when the well pad is not permitted to be constructed directly on top of the plants. As the Glenwood Springs Field Office's 1999 Oil and Gas Leasing and Development FSEIS reports "[t]he total amount of surface disturbance associated with oil and gas development is a primary factor in determining impacts to soils . . . Construction of 1,200 additional wellpads may result in a large amount of soil being moved locally in the short-term, resulting in sedimentation of nearby streams and some loss of site productivity." U.S. Dep. of Interior, BLM, GSRA (1999c) at ES-8. Additionally, oil and gas facilities often badly fragment habitat. The Wilderness Society (2002). Aside from the ground disturbance, compressor stations and well pumps release pollutants into the air, and waste products contaminate habitat. Clarren (1999); Clifford (2001).

Additionally, seismic exploration activities, which often precede drilling, may crush large swaths of vegetation, destroy biological soil crusts, compact soils, bury vegetation, decrease nitrogen fixation activity, introduce noxious weeds, increase soil erosion by wind and water, (Boyle and Connaughton, 2002; U.S. Dep. of Interior, BLM, Moab Field Office, 2002), as well as fragment habitat. Even shot hole exploration requires the use of vehicles such as drilling rigs and recording trucks. Evans (1997). The effects of seismic exploration are long-lasting, and may persist for 50-300 years after activity ceases. U.S. Dep. of Interior, BLM, Moab Field Office (2002); Belnap (2002). Routes used for seismic exploration often turn into established roads. McLellan and Shackleton (1989); Crawford (2001); Zimmermann (2001); Belnap (2002); U.S. Dep. of Interior, BLM, Moab Field Office (2002); Conway (2002). In fact, the BLM has acknowledged that tracks from seismic exploration conducted in the 1970's remained visible in 2002, and are often used as roads and trails by motorized vehicles. U.S. Dep. of Interior, BLM, Moab Field Office (2002).

The Parachute penstemon populations are all found on steep, south-facing escarpments of the Roan Plateau, including those of the former Naval Oil Shale Reserve. BLM classifies the steep southerly escarpments along the Naval Oil Shale Reserve as an area "with high to very high soil loss." U.S. Dep. of Interior, BLM, GSRA (1983) at 83. These are areas that "generally have excessive rates of geologic erosion because parent materials are soft and easily erodible,

slopes are steep, and vegetation cover is poor." *Id.* BLM identifies "mineral exploration/development" as one of the "[p]rimary factors contributing to erosion, other than geologic erosion." *Id.* at 83 - 84. The highly erosive land on which Parachute penstemon will make these places very sensitive to energy development. Though Parachute penstemon has evolved to tolerate a substrate that is subject to natural movement because of steep slopes, this does not suggest that it can tolerate the additive erosive effects of motor vehicles or heavy machinery.

(c) Status of threat from traditional oil and gas development to each population

i. Private land populations: Mount Callahan East and West

Future plans by Occidental Oil for traditional oil and gas development at these sites are unknown. A search of the Colorado Oil and Gas Commission on-line database returned no existing facilities in the sections containing these populations. However, 39 wells were found in a January, 2004 search for facilities (wells and leases) in sections adjacent to those containing the Mount Callahan East population. Colorado Oil and Gas Conservation Commission, Database, (visited Jan. 6, 2004) http://oil-gas.state.co.us. CNHP records indicate with regard to Mount Callahan West that there is "natural gas and oil drilling in the area," but not its exact location. CNHP, EOR (2003).

In the nearby Permian Basin which included parts of Texas and New Mexico, "Occidental currently operates more than 13,000 wells in ten of the largest oil fields ever discovered in the United States, and eight of the ten largest fields in the Permian Basin" where the "massive infrastructure . . includes natural gas facilities." Occidental Petroleum website, Permian Basin Overview (visited Feb. 12, 2004) http://www.oogc.com/world_oper/unit_stat/permian.htm. The populations on Mount Callahan have no regulatory protection whatsoever, and any such drilling and infrastructure construction there would almost certainly cause significant harm to these populations.

ii. BLM populations

Oil and gas development on the land where the Mount Logan population is located is addressed by the Glenwood Springs Field Office's 1999 ROD and RMPA for Oil and Gas Leasing and Development, as explained above. U.S. Dep. of Interior, BLM, GSRA (1999a, b). Oil and gas development for the Anvil Points Mine and Anvil Points Rim populations is not covered by this plan, but will be covered by the upcoming Roan draft plan.

The Glenwood Springs Field Office's 1999 RMPA for Oil and Gas Leasing and Development assumed that virtually all BLM land in the planning area would be available for energy development. U.S. Dep. of Interior, BLM, GSRA (1999c) at 1-8 ("At issue in preparing a Preferred Alternative is not "if" BLM lands will be available for oil and gas leasing, but "how.") The impetus for the 1999 RMPA was that a much higher level of oil and gas development was

occurring than had been foreseen in the last round of planning. For example, 72 wells were drilled in eight years when that number was expected in twenty years. *Id.* at 1-1.

The provisions in the 1999 RMPA for Oil and Gas Leasing and Development will not apply to any leases granted prior to completion of that plan; those can only be restricted to the extent that such changes would be consistent with the original lease rights granted. For leases granted under this plan (which includes the one open lease coincident with a BLM population), a stipulation entitled "No Surface Occupancy ("NSO") Stipulation for Threatened or Endangered Species" applies to candidate species, including Parachute penstemon

The provision for NSO specifies that it applies to habitat areas for species listed federally or by the state as threatened or endangered, and also to "federal proposed or candidate species." U.S. Dep. of Interior, BLM, GSRA (1999b) at 7. However, the following broad exception applies:

> Exception: Surface occupancy may be authorized, pending Section 7 consultation with the U.S. Fish and Wildlife Service on federal Threatened or Endangered species or with the Colorado Division of Wildlife for state listed species. The AO will consider the type and amount of surface disturbance, plant frequency and density, relative abundance of habitat, species and location, topography, and other related factors.

Id.

There is no Section 7 consultation for candidate species, only for species listed as threatened or endangered. For candidate species, the list of exception factors in the second sentence would be applied. We are unaware of any tests of this NSO stipulation with regards to candidate species on lands administered by the Glenwood Springs Field Office. We located one lease overlapping a BLM Parachute penstemon population that contains this NSO stipulation (*see* Mount Logan discussion in this section below), but no drilling associated with this lease has yet occurred.

Given the exception factors, this stipulation appears easily waived at BLM's discretion, and it is clear that BLM has a propensity to waive species protection stipulations. For example, despite the fact that the sage grouse is listed as a Sensitive Species by the Wyoming State Office of the BLM, the Pinedale Field Office in Wyoming made exceptions to stipulations designed to protect sage grouse winter and nesting habitat 30 times in the less than three months for which data are available on their web page. U.S. Dep. of Interior, BLM, Pinedale Field Office website *Sage Grouse Winter & Nesting Exceptions* (visited Feb. 14, 2004) http://www.wy.blm.gov/pfo/wildlife/wild_sage_exc0204.htm. Additionally, the Pinedale Field Office made exceptions to raptor winter and nesting protections thirteen times in less than three weeks, and to winter range protections 51 times in less than three months. *Id., Raptor Winter and Nesting Exceptions* (visited Feb. 14, 2004) http://www.wy.blm.gov/pfo/wildlife/wild_raptor_exc0204.htm; *Wildlife Winter Range Exceptions* (visited Feb. 14, 2004)

http://www.wy.blm.gov/pfo/wildlife/wild_winter_exc0204.htm. The BLM is just as likely to waive protective stipulation here.

Importantly, the Glenwood Springs Field Office's 1999 FSEIS describes instances where the field office attempted to mitigate the impacts of oil and gas development on sensitive plants, but failed to avoid significant damage. In one example, discussed above, "a wellpad was relocated less than ten feet to avoid a population of BLM Sensitive plants. Subsequent visits to the site determined that the new road and pad had become a conduit for livestock travel and the rare plants had been damaged by grazing and trampling." U.S. Dep. of Interior, BLM, GSRA (1999c) at 4-34. This example illustrates that even if a NSO stipulation is successful at preventing surface occupancy coincident with the plants, this does not always prevent harm to them from oil and gas development.

In another example, also discussed above, on land previously held by the DOE but now held by the BLM, "the DOE moved a well pad slightly to avoid the highest concentration of (Special Status) plants but did destroy a sizeable number of individuals." *Id.* Application of the NSO exception factors could easily lead to a decision like this regarding a Parachute penstemon population; such treatment is unacceptable for this plant.

Similarly, in another instance also discussed above, the BLM found that a proposed well pad site would have destroyed "several dozen BLM Sensitive plants." *Id.* However, alternative well pad sites would have required greater cuts and fills, creating more impacts to the drainage, so the well pad was moved only slightly resulting in "avoid[ance] of a clump" of the BLM Sensitive plants, while "a dozen or so were directly impacted by well construction." *Id.* This is also a possible, and unacceptable, outcome of the application of the NSO exception factors.

Another big shortfall of the NSO provision, even if it were applied without exception, is that it does not appear to prevent activities on the slopes above Parachute penstemon plants or habitat. Disturbance in these areas could have devastating effects on the plants and/or habitat by altering runoff patterns, causing sedimentation, eroding the slopes below, or other physical destruction. Similarly, side cast from well pad construction can damage plants even if the well pad is not permitted to be constructed on top of them.

Lastly, the NSO stipulation does nothing to protect the habitat of the plant's pollinators. Parachute penstemon is primarily an outcrossing species (McMullen, 1998), many of its pollinators are ground nesters, and conservation of the suite of its pollinators is critical for its survival (*see* § VII(E)(3) below for full discussion).

Mount Logan

This population is just to the southwest of Mount Callahan on the cliffs of the Roan Plateau, an area covered by the Glenwood Springs Field Office's 1999 ROD and RMPA. U.S. Dep. of Interior, BLM, GSRA (1999a, b). It has much more extensive leasing and development history than the other two BLM populations because, unlike those, it is covered by a current BLM plan that enables leasing to occur.

We conducted a search of the BLM LR2000 database for wells and other energy development facilities that intersect the sections where this populations is found. U.S. Dep. of Interior, BLM, LR2000 database (visited multiple times Dec. 2003, & Jan. 2004) http://www.blm.gov/lr2000. We found that BLM has granted the following rights to private oil companies in all or part of these sections (permits were still open and authorized at the time of our search unless otherwise noted):

(1) Granted an oil and gas pipeline right-of-way to Occidental Oil Shale. The oil pipeline is 50 ft. by 1756.47 ft. (5.63 acres). This also involved an 80 ft. x 85 ft. wash tank, a 265 ft. x 285 ft. storage tank, a 30 ft. x 763 ft. access road and a caretaker site, and a few other items. Total acres 5.630. (COC022434; granted 1975) (Section 25)

(2) Granted road right-of-way to private companies Occidental Oil Shale and Glenn. Spgs. Holdings. Total length is 9.33 miles with a variable width; total acres 58.55. (COC023027; granted 1977) (Section 25, 36)

(3) Granted an oil and gas lease SIMO to Birtoil Ventures Inc. and McMoran Oil & Gas Co. Total acres 1,942.130. (COC025290; effective date 1977; closed 1986) (Section 36).

(4) Granted a road right-of-way to Shell Oil Co. Total length is 8.1 miles with a width of 40 feet; total acres 39.27. (COC036737; granted 1983; closed in 1992 but see next entry which is for same right-of-way). (Section 25, 36)

(5) Granted a road right-of-way to Shell Frontier Oil & Gas. Total length is 8.10 miles with a width of 40 feet; total acres 39.27 (COC036737FD; granted 1983). (Section 25, 36)

(6) Granted an Oil and Gas Lease SIMO to multiple private petroleum companies. Total acres equal 644.930, including the south half of section 25, where this population is apparently located. (COC036968; lease issued 1983; closed in 1993). (Section 25)

(7) Granted a right-of-way for a "water facility" to Occidental Oil Shale and Glenn. Spgs. Holdings. Includes a water pipeline and an evaporation pond. Total acres 43.080. (COC038492; granted 1984). (Section 25)

(8) Granted a road right-of-way to Williams Production RMT Co. Road length is 7.5 with a width of 40 feet; total acres 36.360. (COC038510; granted 1984). (Section 25)

(9) Granted a right-of-way for a water facility to Glenn. Spgs. Holdings. Total acres .115. (COC043104; granted 1987). (Section 25)

(10) Granted an oil and gas lease SIMO to a group of private petroleum and drilling companies. Total acres 1,942.130. (COC044971; lease issued 1987; closed 1997). (Section 36)

(11) Granted a Mineral Patent Placer (mining claim) for petroleum and oil shale to Mount Logan Co. Total acres 963.320. (COC048471; final cert. issued 1990; closed in 1996). (Section 25, 36)

(12) Granted a road right-of-way to Carl E. Gungoll Exploration Inc. Total length is 8.71 miles with a width of 40 feet; total acres 42.24. (COC058104; granted 1995). (Section 25, 36)

(13) Granted an oil and gas lease COMP to Badak Gas Marketing. Total acres 1,472.040. (COC060435; lease issued 1997; closed 2001). (Section 25)

(14) Granted an oil and gas lease COMP to EnCana Oil and Gas USA, Inc. Total acres 646.770. (COC064193; lease issued 2000). Section 36.

(15) Granted a road right of way to Jelco GV Inc. Total length 10.58 with a width of 35 feet; total acres 44.9. (COC066163; granted 22). (Section 25, 36)

(16) Case type: "Contest-Mult Use Con-BLM"; Commodity 911: "All locatable min." (COC066484; closed 1996). (Section 25, 36)

The lease to EnCana Oil and Gas USA, Inc. (COC064193) (number 14 on this list) is a currently open oil and gas lease that covers all of section 36 (646.770 acres), one of the two sections where the Mount Logan population is located. This lease thus overlaps Parachute penstemon plants. Since this lease was issued in 2000, the terms of the lease are dictated by the Glenwood Springs Field Office's 1999 ROD and RMP. U.S. Dep. of Interior, BLM, GSRA (1999a, b).

According to our search of the on-line databases of the BLM (LR2000) and the Colorado Oil and Gas Commission, no wells have been drilled for this lease yet. U.S. Dep. of Interior, BLM, LR2000 (visited multiple times Dec. 2003, & Jan. 2004) http://www.blm.gov/lr2000; Colorado Oil and Gas Conservation Commission (visited Jan. 6, 2004) http://oil-gas.state.co.us. However, EnCana, Canada's "top oil and gas company" and the "most active driller in the U.S. Rockies" expects its production from the Rocky Mountain region to increase by 21% in 2004. Claudia Cattaneo, Calgary Bureau Chief, *EnCana expects riches from U.S. energy bill*, Financial Post (Nov. 21, 2003). This is because the U.S. energy bill (which passed the House but not the Senate in 2003) would provide $3.09 billion in tax credits for unconventional oil and gas production (all the gas in the Rockies is classified as unconventional). *Id.* EnCana's CEO says that the Energy Bill will result in a 5% increase in rate of return for new projects in the Rockies, cutting of red tape, and promoting land access and the building of "much needed pipeline infrastructure." *Id.* The credits will remain in place through 2006 (*Id.*); thus the coming years will likely be the time when EnCana starts extensive drilling in this lease area.

There are also multiple road, water facility and oil pipeline right-of-ways granted to private companies that crisscross the area. These were all granted prior to the 1999 ROD and

RMP. Thus protections for plants would not be dictated by the 1999 ROD and RMP, but by the less protective standards in the Glenwood Springs Field Office's 1984 RMP (as revised in 1988).

The closest well as of December 9, 2003 was located approximately two miles away. It is administered by the Federal government and held by Barrett Resources Corp.

Anvil Points Rim

The BLM has not yet begun leasing this area yet, pending completion of the Roan draft plan. However, all indications are that the soon to be released Roan Plateau draft plan will include extensive leasing and energy development of the area, including drilling on top of the plateau. Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the lat energy boom. Will this one destroy it?* Westword, (Jan. 1, 2004).

BLM has already granted one exploration permit that includes all or parts of the section where this population is located. U.S. Dep. of Interior, BLM, LR2000 (visited multiple times Dec. 2003, & Jan. 2004) http://www.blm.gov/lr2000. This Oil and Gas Geophysical Exploration permit, still open, authorizes Western Ge. Co. to conduct seismic exploration on 47.4 acres (COC064647; approval given 2001).

The closest well as of December 9, 2003, was located approximately 1.25 miles away in the Rulison Field. It is owned by the DOE.

Anvil Points Mine

The BLM has not yet begun leasing this area yet, pending completion of the Roan draft plan. The BLM has granted the following rights to private oil companies that include all or parts of the sections where this population is located (permits were still open and authorized at the time of our search unless otherwise noted):

(1) Granted a road right-of-way to Mobil Alternative Energy, Inc. Total length and width unknown. (COC063142; granted 1982; closed 1984)

(2) Granted an Oil and Gas Geophysical Exploration (EXCP AK?) permit to Western Ge. Co. Total acres 47.4. (COC064647; approval given 2001)

(3) Cancelled a petroleum and oil shale permit; dated to 1955. (COC0012327)

The closest well as of December 9, 2003 was located approximately 1.2 miles away in the Rulison Field. It is administered by the Federal government and held by Williams Production RMT Co.

(d) Summary: threats from traditional oil and gas development are significant and demand immediate action

Traditional oil and gas development carries a host of threats to native plants. Many of these threats stem from the massive infrastructure associated with extracting these resources, such as the 8.43 miles of linear infrastructure per square mile found in one recent study. The Wilderness Society (2002). Wellpads and their reclamation, pipelines, roads and other facilities can all directly impact plants or their habitat, or indirectly damage these through the spread of noxious weeds, displacement of sediment, or the alteration of hydrologic flow.

Two of the populations, including the one with the highest number of plants, are located on private land owned by an oil company. Part of the BLM population on Mount Logan is encompassed in an open oil and gas lease, and the other two are in the planning area for a soon to be released BLM plan widely anticipated to massively accelerated oil and gas leasing in the planning area. None of the populations are adequately protected from these threats.

Parachute penstemon is facing quickly mounting threats due to changes in federal policy and economic conditions influencing energy development. Huge proposed tax incentives for drilling the natural gas resources within Parachute penstemon habitat, and the existence of several large oil and gas leases already occurring in and near the plant's known locations threaten the plant.

2. Oil shale mining remains a very real threat and could devastate Parachute penstemon

The 2002 Candidate Listing and Priority Assignment form for Parachute penstemon, prepared by the Service, notes that the plant's habitat is "the major source of oil shale in the United States." U.S. Dep. of Interior, FWS (2002). A resurgence in oil shale mining is widely seen as a very significant threat to the plant. Although oil shale mining is not currently taking place on any large scale in the area, oil shale companies there continue to hold condition water rights permits for oil shale mining, a significant amount of oil shale mining occurred twenty years ago, and Shell oil has a major experimental program in the area now. Feasibility of oil shale mining is likely just an economic turn away.

(a) Oil shale resources are extensive within the range of Parachute penstemon and development is foreseeable

It is no accident that an entity named Occidental Oil Shale, Inc. owns the land upon which the two known privately held Parachute penstemon populations are found - Parachute penstemon is restricted to a narrowly distributed geologic stratum that is "the major source of oil shale in the United States." U.S. Dep. of Interior, FWS (2002).

The oil shale resources of the Piceance Basin are substantial. For example, 7.5 billion barrels of oil were estimated to underlie the 31,204 acre parcel for which the BLM Glenwood Springs Resource Area managed the oil shale reserves when it wrote its 1983 FSEIS. U.S. Dep.

of Interior, BLM, GSRA (1983c) at 88. Thirteen billion barrels are estimated to be contained in 50,000 acres of land owned by Getty Oil Exploration Company in Garfield and Mesa Counties. *Municipal Subdistrict, Northern Colorado Water Conservancy District v. Getty Oil Exploration Co.*, 997 P.2d 557, 560 (Colo. 2000) (en banc) (upholding water court's finding of Getty's reasonable diligence regarding its conditional oil shale water rights). On Raven Ridge (located west of the known Parachute penstemon populations but on the same formation) outcrop samples of the Parachute Creek Member of the Green River Formation have yielded up to 25 gallons of oil per ton of shale, and unweathered shale beneath the surface should produce even higher yields. U.S. Dep. of Interior, BLM, White River Resource Area (1987).

Oil shale mining was pursued in western Colorado starting in 1946 with the U.S. Bureau of Mines at the Anvil Point oil shale demonstration project, but did not turn out to be economical. Youngquist (1998). While currently there is no active large scale oil shale mining in the vicinity it is well recognized that a major oil shale mining program is foreseeable in the Piceance Basin. With regards to Parachute penstemon, the Service noted in its 2002 CLPA Form that "the economic climate could change at any time making [oil shale and energy development] financially viable." U.S. Dep. of Interior, FWS (2002).

The fact that oil shale mining remains a real possibility is evidenced by three recent en banc opinions of the Colorado Supreme Court. In 1999 and 2000, that court held in three separate cases that oil companies had exercised reasonable diligence and met the "can and will" test regarding their conditional water rights for oil shale development. *Municipal Subdistrict, Northern Colorado Water Conservancy District v. Chevron Shale Oil Co.*, 986 P.2d 918 (Colo. 1999) (en banc) (*Chevron*); *Municipal Subdistrict, Northern Colorado Water Conservancy District v. OXY USA, Inc.*, 990 P.2d 701 (Colo. 1999) (en banc) (*OXY*); *Getty*, 997 P.2d 557.

Under Colorado law, a party holding a conditional water right must apply every six years to the water court for a finding of reasonable diligence regarding its development of that conditional water right. Conditional water right holders must prove "reasonable diligence" by demonstrating "the steady application of effort to complete the appropriation in a reasonably expedient and efficient manner under all the facts and circumstances." § 37-92-301(4)(b), 10 C.R.S. (1999). During a reasonable diligence proceeding, the water right holder must also establish that it meets the "can and will" test found at § 37-92-305(9)(b). This provision states:

> No claim for a conditional water right may be recognized or a decree therefor granted except to the extent that it is established that the waters can be and will be diverted, stored, or otherwise captured, possessed, and controlled and will be beneficially used and the project *can and will be completed* with diligence and *within a reasonable amount of time.*

(emphasis added).

In each of the three recent cases, the court found reasonable diligence, citing numerous actions and expenditures that the company had undertaken towards the goal of developing its oil shale resources. The court also found that in each case the company "can" complete its oil shale

development project, and that it "will" complete the project when economic conditions improve in the oil shale business. *OXY*, 990 P.2d at 708 (finding no error in the water court's ruling that "the oil shale project is technically feasible given current technology—or, in other words, that OXY "can" complete the project" and that "OXY "will" complete the project when the current economic conditions facing the oil shale industry no longer exist."); *Getty*, 997 P.2d at 565 (concluding that the issue is governed by *OXY*, and upholding the water court's findings that "Getty "can" complete the project" and that "Getty "will " go forward with the project when it becomes economically feasible."); *Chevron*, 986 P.2d at 923 (finding that holder of conditional water right was not required to meet the "can and will" test on the facts there, *but see OXY*, 990 P.2d at 708 "conclusion of [Chevron] water court was sufficient to satisfy both the "can and will" standard and the reasonable diligence standard.") In an issue not addressed in the other two opinions, the OXY Court further found that the company met the requirements of the anti-speculation doctrine because it demonstrated intent to pursue the oil shale projects to completion in the future. *OXY* at 708-709.

Based on this line of cases, it is clear that oil shale mining remains a clear risk for the plants. Parachute penstemon must be listed as threatened or endangered before this mining occurs because, as the Service itself recognized in the 2002 CLPA Form, "if the Fish and Wildlife Service waits until increased mining activity takes place . . . the species will likely be extirpated." U.S. Dep. of Interior, FWS (2002).

In addition to the three companies involved in the Colorado Supreme Court cases discussed above, Shell Exploration and Production Co. has been conducting active experimentation in the Piceance Basin since 1996 that may have bearing on the economics of oil shale extraction. It is actively pursuing a new method of oil shale extraction (described in the Mechanics section below), with over ten people drilling at the experiment site and "with the oversight of a constant stream of additional consultants and Shell scientists" Lofholm (2001) at 8A. Relatively low oil prices are not seen as a hindrance to this research, as "[p]art of Shell's mission is to devise a technology that will not be affected by fluctuating oil prices" *Id.* In November of 2001, Rich Hansen of Shell stated, "We're pretty excited about this." *Id.* at 1A.

The Service has provided on-point analysis regarding the threat of oil shale mining in its 1990 Final Rule for the listing of the Dudley Bluffs Bladderpod (*Lesquerella congesta*) and Dudley Bluffs Twinpod (*Physaria obcordata*) as threatened species. 55 Fed. Reg. 4152, 4154 (Feb. 6, 1990). Like Parachute penstemon, these species are very rare oil shale endemics found exclusively on the Green River Formation in the Piceance Basin, each being known at the time of the listings from only five populations. *Id.* at 4152 ("With the exception of the recently described *Penstemon debilis* (O'Kane and Anderson 1987), these two herbaceous perennials are the rarest of several oil shale plant species in the Piceance Basin.")

In the Summary of Comments and Recommendations section of this listing rule, the Service responds to a comment by oil shale companies (Issue 2) that "there are no current threats to these species because there is no current oil shale mining occurring in the Piceance Basin." *Id.* at 4154. The Service's response was that the proposed rule recognized oil shale development as being large scale but not imminent, but "because this development could potentially endanger

these plants which were not protected under State or Federal law, the plants fit the definition of threatened species under the Act, i.e., species likely to become endangered within the foreseeable future throughout all or a portion of their range." *Id.* Because in the instant case oil shale mining is foreseeable across the entire range of the Parachute penstemon, and because Parachute penstemon is not adequately protected by any State or Federal law, the Service must reach the same conclusion here.

(b) Mechanics of oil shale mining impacts

Technically, Colorado oil shale does not contain oil, but rather an organic material called kerogen that can be converted into a liquid that can be further processed into oil. Youngquist (1998). In order to convert kerogen into oil it must be heated to approximately 900 degrees F (some report the temperature to be 1000 degrees F.). *Id.* The process of heating the oil shale this way is called retorting, and there are basically three processes that have been used: above-ground, modified *in situ*, and true *in situ*. Congress of the United States (1980), Appendix.

Above-ground retorting involves mining the oil shale and trucking it to a processing area where the retorting takes place. *Id.* This type of retorting would have obvious impacts on the landscape as it would leave behind essentially huge open pit mines. Large scale oil sand mining is currently occurring in Alberta, Canada with this effect. Suncor website, About Us, What We Do (visited Feb. 22, 2004) http://www.syncrude.com/who_we_are/01_04.htm. Though oil sand is a different substance than oil shale, the processing is similar in that both substances must be superheated to get the end product of oil. *Id.*, Upgrading http://www.syncrude.com/who_we_are/01_04_3.html; Congress of the United States (1980), Appendix

In modified *in situ* retorting, "a portion of the shale is mined out, and the rest is fractured with explosives or by other means to create a highly permeable zone though which hot fluids can be circulated." Congress of the United States (1980). Occidental Oil, which owns the land where two Parachute penstemon populations are found, has tried a modified *in situ* process in the area where a series of small rooms were excavated, blasting filled these rooms with oil shale rubble, the area was set on fire with temperatures reaching 900 degrees F., and the oil was drained into a sump. *Id.* Other reports of modified *in situ* retorting in western Colorado from the early 1980's include a party taking a one square mile area, grading it flat, dynamiting the area, and then setting it on fire to attempt oil recovery. CNE, *et al.* (2002). A likely impact from such practices would be the widespread damage to native vegetation across these areas, considerable indirect effects in adjacent areas, and all of the infrastructure impacts associated with traditional energy development.

Another experiment with modified *in situ* retorting took place near Rifle, Colorado in the 1960's using nuclear explosions to recover oil from oil shale slopes. The U.S. Atomic Energy Commission (a precursor to the DOE) conducted these nuclear tests, some of which occurred as close as Rifle, Colorado, as part of the Plowshare Program. In a summary of the objectives of the Plowshare Program, the DOE wrote, "Underground nuclear explosion applications

included...creation of underground zones of fractured oil shale for *in situ* retorting." Dep. of Energy (undated) at 1.

The method that Shell is experimenting with is an *in situ* process where superheated water is injected underground to melt the oil, which is then pumped aboveground. Alexander's Gas & Oil Connections website, *Shell experiments with new method extracting shale oil* (visited Feb. 12, 2004) http://www.gasandoil.com/goc/company/cnn20205.htm. The ecological impacts of an *in situ* process like this will include all of the infrastructure impacts discussed with regards to traditional oil and gas development, and likely others.

Exacerbating the likely impacts of oil shale mining are the soil conditions found in the Parachute penstemon range. The Parachute penstemon populations are all found on steep, south-facing escarpments of the Roan Plateau, including those of the former Naval Oil Shale Reserve. BLM classifies the steep southerly escarpments along the Naval Oil Shale Reserve as an area "with high to very high soil loss." U.S. Dep. of Interior, BLM, GSRA (1983) at 83. These are areas that "generally have excessive rates of geologic erosion because parent materials are soft and easily erodible, slopes are steep, and vegetation cover is poor." *Id.* This type of erosiveness makes a landscape very vulnerable to surface disturbance from development. BLM identifies "mineral exploration/development" as one of the "[p]rimary factors contributing to erosion, other than geologic erosion." *Id.* at 83, 84. Though Parachute penstemon has evolved to tolerate a substrate that is subject to natural movement because of steep slopes, this does not suggest that it can tolerate the additive erosive effects of motor vehicles or heavy machinery.

(c) Status of threat from oil shale mining to each population

i. Private land populations: Mount Callahan East and West

Both of these populations are found completely on land owned by Occidental Oil. Occidental Oil owns more than 10,000 acres of land in Garfield County alone that contain "significant oil shale reserves." *OXY,* 990 P.2d at 705 (referring to the entity as "OXY"). Among these parcels are the parcels where the Mount Callahan East and B populations of Parachute penstemon are found. As discussed above, in a 1999 en banc opinion the Colorado Supreme Court upheld in pertinent part the decree of the Water Division below that Occidental Oil met the "can and will" and the reasonable diligence standards with regards to the conditional water rights it holds for the development of its oil shale lands. *OXY,* 990 P.2d 701.

The court found no error in the Water Division's ruling that "the oil shale project is technically feasible given current technology—or, in other words, that OXY "can" complete the project" and that "OXY "will" complete the project when the current economic conditions facing the oil shale industry no longer exist." *OXY,* 990 P.2d at 708. The Water Division's Findings of Fact, Conclusions or Law, Judgment and Decree detail the expenditures made by OXY during the six year diligence period for the hexennial water right review. *Municipal Subdistrict, Northern Colorado Water Conservancy Dist. v. OXY USA, Inc.*, No. 95CW201 (88CW180) (Colo. Water Div. 5 Oct. 13, 1998), *aff'd in pertinent part,* 990 P.2d 701 (Colo. 1999) (en banc). The Water Division found that during this period OXY spent in excess of five million dollars

related to preserving and developing its conditional oil shale water rights. *Id.*, No. 95CW201 at 9.

In summary, the two Parachute penstemon populations found completely on land owned by Occidental Oil are likely a simple economic turn away from decimation by oil shale mining. These populations account for over 90% of known Parachute penstemon plants and this loss would likely be devastating to the species.

ii. BLM populations: Mount Logan, Anvil Points Rim and Anvil Points Mine

These populations are found on rich oil shale substrate. Both of the Anvil Points populations are located on what was formerly called the Naval Oil Shale Reserve. It does not appear that BLM has any immediate plans to begin oil shale mining, but if oil shale development becomes economically advantageous, these populations would likely face great threats.

(d) Summary: oil shale mining impacts are foreseeable and would be devastating

While there is currently no oil shale mining occurring in Parachute penstemon populations, research breakthroughs or market fluctuations could quickly result in an oil shale mining boom throughout the region, and these Parachute penstemon populations are restricted to precisely the geologic stratum that that will be targeted in such activities. This geologic layer is, in fact, "the major source of oil shale in the United States." U.S. Dep. of Interior, FWS (2002). The Colorado Supreme Court recently ruled that three separate oil companies, including Occidental Oil, that the companies had met the due diligence and the "can" and "will" test regarding their conditional water rights for oil shale development, indicating that oil shale mining remains a real threat.

The two largest populations are located on land privately owned by an oil shale company and benefit from no regulatory protection. Consequently, Parachute penstemon's already high risk of extinction will increase dramatically if oil shale mining becomes economically feasible in the United States, as oil sand mining has become in Canada.

3. Coalbed methane development and/or coal mining may constitute threats due to the resources present and the processes for extraction

Another threat from energy development comes from the area's potential for coal and coal-bed methane development. While this threat is hard to estimate, it is significant due to the resources present.

(a) Coalbed methane and coal resources are present within the range of Parachute penstemon and exploratory work is occurring

The Cameo Coal Zone underlies the Roan area and EnCana is doing some exploratory work for coalbed methane development in this vicinity. Pers. comm. Pete Kolbenschlag (2004a). Although the Roan Plateau is not in the area designated "Acceptable for further consideration for coal leasing" in the 1983 Glenwood Springs Field Office's FSEIS, we briefly discuss the impacts of coal mining given the resources present. U.S. Dep. of Interior, GSRA (1983c), Map 3-4.

(b) Mechanics of impacts from coalbed methane development and coal mining

Impacts from coalbed methane (CBM) development include roads, pipelines, transmission lines and compressor stations. One study found that 0.3 miles of new road were needed for each coalbed methane well. U.S. Dep. of Interior, BLM, Buffalo Field Office (2002). A drilling company can use 2-10 acres of land, per drill site. Western Slope Environmental Resource Council website (visited Feb. 9, 2004) http://www.wserc.org/infosheet.html. The surface damage from CBM development can be extensive. For example, in a recent Montana court case, a jury returned a verdict against Paxton Resources, Inc. for damaging a privately held ranch during its CBM development of the split estate. The Brannaman ranch was awarded over $800,000 in damages, and over $500,000 of those damages were for the replacement of topsoil to repair extensive damage including gouging out the land surface with heavy equipment that left massive ruts, eroded hillsides, and compacted soil at drill sites. *See* Save the Grand Mesa website (visited Feb. 9, 2004) http://www.savethegrandmesa.com/; Powder River Basin Resource Council website (visited Feb. 9, 2004) http://www.powderriverbasin.org/final_commentsfeis.htm.

In addition, methane gas is often held in the coal beds by water in which case huge amounts of groundwater must be pumped from underground aquifers in order to release the methane. This water is often saline, contaminated with dissolved solids and minerals, or laced with carcinogens including benzene toluene, ethylbenzene and xylene. Western Slope Environmental Resource Council website (visited Feb. 9, 2004) http://www.wserc.org/infosheet.html. This water must be disposed of either by placing it in evaporation ponds, allowing it to leave the site as runoff, or reinjecting it back into the underground aquifers. *Id.* Due to the large amount of water that must be disposed of, if ponds are employed their construction causes extensive surface damage. Additionally, as the water levels in evaporation ponds drop, salt and other contaminants are exposed to wind erosion and can cause damage to downwind areas. *See* Powder River Basin Resource Council website, Dr. Munn, expert testimony (visited Feb. 9, 2004) http://www.powderriverbasin.org/final_commentsfeis.htm. Runoff can contaminate streams, and reinjection can cause a suite of problems with the underground aquifers. *See* Powder River Basin Resource Council website (visited Feb. 9, 2004) http://www.powderriverbasin.org/final_commentsfeis.htm.

Impacts from coal mining are also often severe and can include massive surface disturbance. Whether coal is mined using surface mines, longwall mining, or traditional roof-and-pillar operations, disturbance levels are high. Surface mining involves disturbing large areas to create open pit mines. Longwall mining is an underground mining process in which a long underground room of coal is removed using a movable hydraulic roof support system to protect the work area. Wyoming Coal website, Glossary (visited March 3, 2004) http://smtc.uwyo.edu/coal/library/glossary.asp. Significant surface disturbance impacts often result when the roof is allowed to collapse after mining out the coal. All three mining techniques are accompanied by extensive road and facility infrastructure impacts.

(c) Summary: coalbed methane development and/or coal mining could be devastating to Parachute penstemon

The imminence and extent of the threats to Parachute penstemon from coalbed methane development and/or coal mining are difficult to estimate at present, but remain a serious concern given the resources present. Any initiation of coalbed methane development or coal mining near these populations would likely be devastating to the plant.

4. Noxious weeds and other plants pose real threats to Parachute penstemon

The spread of noxious weeds and other invasive plants often occurs as a result of energy development, recreation, grazing and other activities. Wellpads are often reclaimed with inappropriate plant mixes, even when regulations specify otherwise. Noxious weeds and invasive plants could threaten Parachute penstemon by out competing it, or by stabilizing the slopes that provides its habitat, making it unsuitable. In the case of Parachute penstemon, even the unnatural spread of native plants, for example through seeding of nearby well pads, could spell disaster.

Even in 1999, according to the BLM, "[s]ome populations of rare plants [in the are managed by the Glenwood Springs Field Office were] experiencing competition from noxious weeds and other invasive plants. These populations are close to roads and other disturbance, so it is likely the disturbance contributed to the establishment of the weeds." U.S. Dep. of Interior, BLM, GSRA (1999c) at 4-34. Additionally, as a recent grazing allotment Environmental Assessment Record prepared by the Glenwood Springs Field Office notes "[l]ivestock congregating along springs, seeps, reservoirs and drainages encourage noxious weed development and encroachment, while seeds are dispersed through livestock travel." U.S. Dep. of Interior, BLM, GSFO, Webster Park/Clough-Alber Environmental Assessment Record (2003) at 13-14.

The portion of the Roan Plateau where the BLM Anvil Points populations are located has not experienced extensive energy development yet, pending completion of the Roan plan. Due to this, the roads near these populations are not being heavily utilized. There are not currently large numbers of invasive plants found along the roads in the area near these populations (pers. comm. Carla Scheck, 2004a) though in 1998 botanists noted that cheat-grass does exist along the road at Anvil Points Rim. CNHP, EOR (2003). The Anvil Points populations are both located

near roads and if drilling occurs on the top of the plateau under the new plan, the spread of noxious weeds from well pads and roads is likely to become a serious threat. Similarly, the Mount Logan population is very near to a road, and increased energy development in this area carries the same concerns. The distance between the Mount Callahan populations and roads is not clear from available information.

One of the BLM populations is within an active grazing allotment, two BLM populations are adjacent to existing active grazing allotments, and cattle reportedly graze on the Mount Callahan (*see* subsection 6 for more detail). Thus cattle could serve as a vector for bringing noxious weeds and other plants to some or all of the Parachute penstemon populations.

The effects on Parachute penstemon from invasions of noxious weeds or other plants as a result of increased disturbance levels could be devastating Control of noxious weeds and invasive plants through control of disturbance and other means is essential for the protection of Parachute penstemon.

5. Roads can adversely impact Parachute penstemon in a myriad of ways, and are likely already doing so

Most if not all of the populations are near roads (the exact proximity of the private populations to roads is not known). Roads could impact Parachute penstemon in a myriad of ways, and these impacts will become more severe if increased development occurs resulting in increased use of existing roads and construction of many new miles of road. Threats from existing roads, especially at the Anvil Points Mine population, have not been addressed, and projected new road miles under proposed development plans pose significant new threats.

(a) Mechanics of road impacts

Roads result in a myriad of ill ecological effects (Forman and Alexander, 1998) several of which are relevant to Parachute penstemon. Roads change soil density, soil water content, dust movement, patterns of runoff and sedimentation, and can add heavy metals to roadside environments. Trombulak and Frissell (2000). Impacts of particular concern for Parachute penstemon include soil compaction, fine particle deposition on the plants, alterations in hydrologic flow above the plants, spread of invasive plants, increased off-road vehicle use, and destabilization of the slopes where the plants are found.

A recent Forest Service General Technical Report explains that:

> Roads affect geomorphic processes by four primary mechanisms: Accelerating erosion from the road surface and prism itself by both mass and surface erosion processes; directly affecting channel structure and geometry; altering surface flowpaths, leading to diversion or extension of channels onto previously unchannelized portions of the landscape; and causing interactions among water, sediment, and woody debris at engineered road-stream crossings

U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 21.

Similarly, off-road vehicle trails in arid regions have been found to increase water runoff and erosion. Hinckley *et al.* (1983). The Forest Service General Technical Report points out that "[s]urface-erosion problems are worst in highly erodible terrain, particularly landscapes underlain by granite or highly fractured rocks (Megahan 1974b, Megahan and Ketcheson 1996). U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 23. Parachute penstemon inhabits highly erodible terrain that the Glenwood Springs Field Office describes as "generally hav[ing] excessive rates of geologic erosion because parent materials are soft and easily erodible, slopes are steep, and vegetation cover is poor." U.S. Dep. of Interior, BLM, GSRA (1983) at 83. Surface-erosion from roads can harm plants, such as Parachute penstemon, located on slopes below these roads. Thus surface-erosion problems should be considered a significant threat to these plants.

For Parachute penstemon, another significant threat from roads is that material from road slides, road repair and road maintenance activities could be deposited onto slopes that serve or could serve as habitat for the plants, destabilizing the slopes, damaging habitat, and/or damaging plants directly. While Parachute penstemon is clearly adapted to some shifting of the talus slopes where it is found, the effects of disturbance above natural rates are unknown. The U.S. Forest Service's recent General Technical Report explains:

> Road-related mass failures result from various causes. Typical causes of failure include improper placement and construction of road fills and stream crossings; inadequate culvert sizes to pass water, sediment, and wood during floods; poor road siting; modification of surface or subsurface drainage by the road surface or prism; and diversion of water into unstable parts of the landscape (Burroughs and others 1976, Clayton 1983, Hammond and others 1988, Furniss and others 1991,Larsen and Parks 1997, Larsen and Simon 1993).

U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 22.

Roads are also widely recognized to promote the dispersal of exotic species. Trombulak and Frissell (2000); U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 32-33. Roads can be both the first point of entry for exotic species, and also a corridor along which the plants move farther into the landscape. U.S. Dep. of Agriculture, Gucinski *et al.* (2001) (internal citations omitted) at 32. Invasive plants could cause problems for Parachute penstemon through competition or through unnatural stabilization of its habitat. A recent field study of roadless habitats found that on both nonserpentine and serpentine grasslands, two exotic species (*Centaurea solstialis* and *Aegilops triuncialis*) were at their lowest frequencies, while a native bunchgrass (*Nassella pulchras*) was at its highest frequency greater than 1000 meters from roads. Gelbard and Harrison (2003). One study showed that abandoned roads had lower

numbers of exotics and a lower frequency of individuals than did roads that were in use. U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 33.

Unpaved roads, such as those found near the Parachute penstemon populations, are a well-recognized source of dust. *See e.g.* Grand Canyon Visibility Transport Commission (1999) at 65-66. A model that was developed and reviewed by the Department of Transportation and the Environmental Protection Agency estimates the amount of dust emitted into the atmosphere by a formula that considers the number and speed of vehicles traveling on a road in a given period, the relative humidity, and the composition of the road surface. U.S. Dep. of Agriculture, Gucinski *et al.* (2001) at 50. Under this formula, the roads near the Parachute penstemon would likely be found to have high levels of dust emissions. Such dust can harm plants by inhibiting transpiration.

Additionally, road maintenance activities involving roadside herbicide spraying could damage the plants, and its pollinators and/or the pollinators' habitats. Lastly, roads could limit recruitment and establishment of Parachute penstemon individuals, or disrupt dispersal.

Road impacts are both short and long term (Schubert & Associates, 1999) and need to be carefully evaluated and controlled near Parachute penstemon and its suitable habitat. For all of the reasons discussed above, roads must be considered a significant threat to the persistence of Parachute penstemon plants and habitat.

(b) Status of threats from existing and projected new roads

Publicly available maps and information regarding the Mount Callahan populations and roads are not adequate to analyze the specific threats that these roads might pose to these populations. Anvil Points Rim is approximately 0.10 to 0.20 miles away from a road. The Mount Logan population is located adjacent to a road, and so is clearly susceptible to road impacts.

Anvil Points Mine, by far the largest population on public land with 500+ rosettes, has a road running through the population (some plants are found above and some below the road). Currently the road is used to access a communications site. Pers. comm. Carla Scheck (2004a). It was originally used to service the Anvil Points oil shale mines, and should oil shale mining resume, it would likely be used again for that. BLM has stated that "[i]t may be that the road itself, being a flat, compacted gravel surface is limiting recruitment and establishment of additional individuals in this area. Maintenance to this road could pose a threat to some of these plants, as well as a number of southwest stickleaf (BLM Sensitive) and Utah fescue (former BLM Sensitive) in the same vicinity." U.S. Dep. of Interior, BLM, GSFO (undated). This road should be closed and restored in a way that protects and provides for Parachute penstemon.

In addition to existing roads, proposed energy development of the Roan Plateau is predicted to bring with it an extensive new road network. An internal Colorado Division of

Wildlife memorandum obtained by the newspaper Westword projects that the projected development could add up to 170 miles of new road on top of the Roan Plateau, a 70 percent increase in the current road miles. Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the last energy boom. Will this one destroy it?* Westword, (Jan. 1, 2004). Obviously, this level of new road construction could pose significant problems for Parachute penstemon given all the road impacts discussed above.

(c) Summary: existing and projected roads pose significant threats to the persistence of Parachute penstemon

Roads clearly pose a number of threats to existing Parachute penstemon plants and to the ability of the species to disperse and establish. Roads are a major vector or livestock, off-road vehicles, noxious weeds and other invasive plants. Additionally, road maintenance and road repair activities could damage the plants in a number of different ways, and roads themselves can limit plant dispersal and recruitment. Road closures should be considered a priority near all of the populations.

6. Livestock grazing may threaten Parachute penstemon

Although cattle are not known to graze the known Parachute penstemon populations, due to the steepness of the habitat and lack of water and vegetation, cattle tracks have been observed within populations and thus trampling may be occurring. NatureServe (2003), *citing* pers. comm. A. McMullen (1998). One of the BLM populations is within an active grazing allotment, another is adjacent to this allotment, and cattle grazing occurs on Mount Callahan.

(a) Mechanics of livestock grazing impacts

Livestock pose threats to Parachute penstemon through direct trampling of plants as well as by serving as a vector for noxious weeds and other invasive plants. Livestock can transport noxious weed seeds on their hides or hooves (Knapp 1996), or by eating weed seeds that remain viable after being eliminated. Lacey (1987, as cited in Belsky and Gelbard 2000) found that 500 grams of sheep manure contained 14 viable halogeton seeds. Impacts of noxious weeds have already been discussed in subsection 4 above.

(b) Status of threats from livestock grazing

Cattle tracks have been observed within at least one population, thus trampling may be occurring. NatureServe (2003), *citing* pers. comm. A. McMullen (1998). While the habitat for this plant is largely too steep for cattle, given the very small number of plants at most of the populations and the very small number of populations, any access by cattle to these populations or nearby habitat poses a serious threat to the persistence of the plant.

i) Private populations: Mount Callahan East and West

Cattle grazing reportedly occurs on Mount Callahan. Though the Articles of Designation for the Mount Callahan Natural Area specify that "[n]o grazing by domestic stock will be allowed on the Property" (at 4), there is no fence to keep the ubiquitous cattle out. Further, reportedly cattle are in this area. With no fence, it is highly likely that cattle go within this Natural Area because it is "an excellent example of a Great Basin grassland" (*id.* at 2) containing vegetation attractive to the cattle. Thus it is likely that both Mount Callahan East (located partially within the Natural Area) and Mount Callahan West (located fully outside the Natural Area) are within grazed areas. The extent to which cattle impact theses plants is unknown.

ii) BLM populations

Grazing is not considered a significant threat to the BLM populations at the present time. However, if the area is developed and the plant communities near the populations change, problems could arise.

Mount Logan

This population is partially within or just adjacent to the County Line allotment. This allotment is managed by the Grand Junction Field Office of the BLM, though part of it is located on land technically within the Glenwood Springs Field Office's boundary. Pers. comm. Harley Metz (2004). The allotment map does not indicate whether there is any effective fencing in use, and it is not known whether any livestock from this allotment, or from other nearby private lands, have access to these plants. The allowable use is 195 cattle, with a season of use from May 1 to May 30, and a total of 193 animal unit months, though actual use of the allotment has been less than allowable use.

Anvil Points Rim and Anvil Points Mine

These populations are adjacent to and within the BLM authorized Webster Park grazing allotment, respectively. Anvil Points Rim is located within approximately 1/6 of a mile of the allotment, and Anvil Points Mine is encompassed by the allotment. An Environmental Assessment Record (CO-140-2003-0009EA) was recently prepared by the Glenwood Springs Field Office for a grazing permit renewal on this allotment (along with the Clough-Alber allotment). Signed September 26, 2003, the decision reissues the grazing permit for a five year term. The permit authorizes 133 active animal unit months, with 567 suspended, totaling 700 animal unit months of permitted use. It is not clear whether there is a functional fence keeping cattle from the population area.

The Webster Park/Clough-Alber Environmental Assessment Record properly identifies Parachute penstemon as a candidate plant in the Webster Park allotment. It states that "[a] population of the Federal Candidate plant, *Penstemon debilis*, is known to occur along the Anvil Points Mine Road on the western edge of the Webster Park allotment. This portion of the allotment is very steep and is accessible only via the Anvil Points Mine Road. Since there is no

water and little forage in the vicinity, livestock do not access this portion of the allotment." At 16.

In 1996, the DOE put a fence up around the Anvil Points Mine population with a sign stating "Authorized Personnel Only" to discourage recreational use at the location. CNHP, EOR (2003). The fence does not form a total exclosure (U.S. Dep. of Interior, BLM, GSFO, undated) so it may not be effective to exclude cattle.

One concern regarding this allotment is that if invasive plants, or even native plants, are spread from reclaimed well pads, the area could become more attractive to cattle and damage to Parachute penstemon, where accessible, could occur. The Anvil Points Mine population is likely critical to the species survival, since it is by far the largest occurring on federal land. Any cattle damage to these plants is thus likely to have a significant adverse impact on this population, and, due to the extremely small number of known populations, on the species as well.

(c) Summary: some populations are within or adjacent to active livestock grazing allotments, and livestock could damage Parachute penstemon

Cattle tracks have been found throughout the slopes inhabited by Parachute penstemon and within at least one population. Both Mount Callahan populations appear to be within grazed areas. At least one BLM population (Anvil Points Mines E) is within an active BLM grazing allotment, one is adjacent to that same allotment (Anvil Points Rim), and one is either adjacent or partially within another allotment (Mount Logan). Given the small number of populations and small number of plants at most of these populations, any damage from livestock grazing could pose significant threat. Grazing impacts should be monitored closely and restricted where damage may be caused to Parachute penstemon plants.

7. Recreation is a known threat to Parachute penstemon

Even though the slopes where the plant is found are steep, recreation impacts have been recorded. Recreational use on the Roan Plateau includes hunting, off-road vehicle driving, backpacking, camping, scenic driving, paragliding and hangliding, and wildlife viewing. These uses are likely to grow as population increases.

(a) Mechanics recreation impacts

Recreating people can easily destroy plants simply by stepping on them. Recreationists can also spread noxious weeds into the populations. Additionally, people can cause ground disturbance near the plants that leads to soil displacement and erosion damaging the plants.

Additionally, off-road vehicles can damage and destroy Parachute penstemons when driven near current or potential habitat, for example by driving on roads or trails located above such habitat. Driving above habitat can damage it by changing the physical aspects of the habitat, for example, by changing the runoff pattern or causing dust to be laid onto the plants.

See § 7(A)(5)(a), Mechanics of road impacts, for further discussion of this threat. Lastly, at least a portion of one of the Mount Callahan sites has a gradient that is gentle enough that off-road vehicles could drive directly over the plants if permitted in the area. *See* Spackman *et al.,* CNHP (1997), Figure 4.

(b) Status of threat from recreation

i) Private populations: Mount Callahan East and West

The extent of public access to the two Mount Callahan populations is unknown. One access road has multiple locks, both keyed and combination, and another private road does not appear to have a gate. Pers. comm. Peggy Lyon (2004). Thus the several individuals and/or parties with keys or combinations have access, as well as perhaps additional people accessing the site from the private road. The frequency and amount of recreational use is unknown.

ii) BLM populations

At the BLM populations, damage to Parachute penstemon from recreating people has been documented despite the steepness of the slopes where Parachute penstemon are found. Spackman *et al.*, CNHP (1997), Anvil Points Rim Conservation Site Profile. Types of recreation that have been noted within the populations include hang-gliding and para-gliding.

Mount Logan

There are no recorded recreational impacts at this site though recreational traffic on the road could easily impact these plants.

Anvil Points Rim

This population has been threatened by recreation use. At one point, a para-glider club chose the location of this population as its launching spot. Spackman *et al.*, CNHP (1997), Anvil Points Rim Conservation Site Profile. Regarding the Anvil Points Rim population, recommended that "[biologists] work with BLM and DOE to assure adequate protection of plants through special designation of site and control of recreational use." CNHP, EOR (2003). They recommended that steps be taken to prevent damage from paragliders, as well trampling by biologists.

In response to the concerns about this recreation, in 1996 the DOE erected a fence around the Anvil Points Rim plants to prevent trampling by people. U.S. Dep. of Interior, Scheck (2002). The fence "semi-solved" the problem. Spackman *et al.*, CNHP (1997), Anvil Points Rim Conservation Site Profile. The fence does not form a complete exclosure so recreational users can still access the plants, though casual use may be deterred. U.S. Dep. of Interior, Scheck (2002).

Anvil Points Mine

Botanists have noted that paleontological collectors pose a threat to this population. CNHP, EOR (2003). The road likely facilitates recreational visits to the site and offers easy access to the plants.

(c) Summary: recreation has been documented at a population site and continues to pose a threat

Inadvertent damage to the plants from recreational uses including hiking, off-road vehicle use, and use of the area for hang-gliding and para-gliding takeoff and landing may pose a significant threat to the plants, at least for the BLM populations where there is likely the most recreation occurring. Impacts include direct trampling, spread of noxious weeds, and alteration of hydrologic flow above populations. Especially as recreational use on the Roan Plateau grows, these impacts need to be monitored for and controlled where occurring.

8. Inadvertent damage by scientists is noted as a concern by botanists

Damage to the plants by paleontologists and biologists is noted by surveyors as one of the threats to Parachute penstemon. CNHP, EOR (2003). Additionally, this species is fragile and scientists have stressed the importance of designing any monitoring program to avoid negative impacts by research methods. Spackman *et al.*, CNHP (1997), Discussion and Recommendations. Thus there appears to be a threat of accidental or negligent damage from scientific investigation of the area generally and from monitoring programs if not properly designed.

9. Climate change will likely exacerbate the effects of all the other threats

Human-caused climate change may lead to the increased frequency and intensity of drought. Houghton *et al.* (1996). Hannah *et al.* (2002) summarized some of the effects of climate change as "changing rainfall patterns, declining water balances, increased extreme climate events, and changes in oscillations such as El Niño." At 264. Although the effects of climate change may show different regional patterns, climate change is occurring on the global scale. Whether or not Parachute penstemon has been affected by climate change yet, or will be directly affected in the future, is still unknown. However, in assessing population viability, regional climate change is an important factor.

Different species will respond to climate change in varying ways. Species that evolved together and adapted in response to one another's phenology may experience a loss of synchrony whereby natural events such as flowering and pollinator emergence that once were timed concurrently become offset because of differing responses to climatic cues. Species may therefore no longer be able to rely on the services once provided by other species. McCarty (2001). This may have serious implications for Parachute penstemon pollination.

Successive years of drought conditions may have especially devastating consequences for long-lived perennials like Parachute penstemon, which may experience population destabilization if adult mortality increases dramatically. Caswell (1986), *as cited* in Hunt (2001); Silvertown *et al.* (1993), *as cited* in Hunt (2001). Hunt (2001) wrote:

> [I]n a stochastic environment the sequence in which seasons of different quality (from poor to good) occur can also be important in determining the long-term dynamics and the likelihood of local extinction of a population (Kalisz and McPeek, 1993). A series of three consecutive seasons with poor rainfall (summer, winter, summer between October 1987 and March 1989) resulted in an increase in adult mortality in *A. vesicariai* on heavily grazed plots during the final summer season.

At 250-251.

Climate change may also contribute to noxious weed invasion. Increases in noxious weeds are to be expected with increased temperatures. McCarty (2001). Alward *et al.* (1999) found that exotic forb density was positively correlated with minimum spring temperatures.

McCarty (2001) wrote that "[o]ngoing climate change is an additional source of stress for species already threatened by local and global environmental changes, increasing the risk of extinction." At 325. Climate change may exacerbate the effects of habitat fragmentation, for example. McCarty (2001). Maschinski *et al.* (1997) also found that unfavorable climatic conditions coupled with trampling accelerated predicted extinction rates for the listed plant *Astragalus cremnophylax* var. *cremnophylax*.

The threat of climate change makes it even more important that the Service take action to limit the threats it can control. Climate change should also be carefully considered in recovery plans by protecting 1) all extant populations, 2) sufficient habitat for movement through time and space given varying climate regimes, and 3) sufficient habitat to allow for functional ecosystems and natural processes even under compromised climatic situations. McCarty (2001) cautions that:

> [C]onservation scientists need to look at climate change as a current, not just a future, threat to species. Although a causal link to climate cannot yet be rigorously demonstrated, the consistent patterns indicate that the prudent course for conservation is to take these changes seriously. Certainly, cases such as the extinction of the golden toad are of immediate concern, but changes in climate need to be taken into account as a possible factor contributing to declines in other species.

At 327.

The restriction of Parachute penstemon to the Parachute Creek Member of the Green River Shale Formation likely increases the threat to it from climate change. Because the plant

has such a narrowly defined suitable habitat that is completely fixed in space, a very narrow distribution, and a narrow elevation range, it may lack suitable habitat to move into in reacting to a changing climate.

As Hannah *et al.* (2002) point out, recovery plans must factor in climate change. This can be done by employing "regional reserve networks, landscape connectivity, and management of the matrix between core reserves, all concepts that are key in effective conservation responses to climate change (Noss & Harris 1986; Noss *et al.* 1999; Soulé & Terborg 1999; Gascon *et al.* 2000)." At 267.

Drought, especially multiple consecutive years of drought conditions, will likely exacerbate the effects of all the other threats to Parachute penstemon detailed in this petition. This substantially increases the importance that the Service take the necessary steps to prohibit those detrimental actions that are within its power to regulate.

10. Summary: Parachute penstemon suffers from extensive present and threatened destruction, modification, and curtailment of its habitat and range

Substantial current threats to Parachute penstemon habitat include existing energy development, grazing, recreation, road repair and maintenance activities, and invasive plants. In light of the fact that this is truly one of the rarest plants in North America, and is known from only five locations, these threats point to a strong need for listing.

Unfortunately, the threats do not end there. Parachute penstemon is perilously perched on a geologic substrate increasingly targeted for energy development. The dramatic acceleration of energy development that is happening in the region, and being proposed throughout the plant's limited range, brings urgency to the necessity for listing. By 1999, the Glenwood Springs Field Office prepared a special Oil and Gas Leasing and Development plan amendment because 72 wells had been drilled in eight years when that number was expected in twenty years. U.S. Dep. of Interior, BLM, GSRA (1999a) at 1-1. Now the development pace is expected to increase even more. The Colorado Division of Wildlife projects that the BLM's plan for the Roan will include 170 miles of new road on the top of the plateau, a 70 percent increase in existing mileage. Alan Prendergast, *Raiding the Roan: Rich in wildlife and natural resources, the Roan Plateau survived the last energy boom. Will this one destroy it?* Westword (Jan. 1, 2004).

Part of one of the BLM populations is in a section that has already been leased for oil and gas development, and only off-site transplants persist at another BLM population. Two of the most significant populations, accounting for over 90% of known plants, occur on private oil company land. Current federal policy signals that the areas where Parachute penstemon are found may soon be developed for energy production. Any of the five populations could be wiped out from one or more of a myriad of impacts associated with traditional oil and gas development. In addition, with a slight change in economic conditions, any of the five could quickly succumb from the extreme surface disturbance of oil shale mining.

Sixteen years ago the botanist who discovered Parachute penstemon recommended that it be listed under the ESA. O'Kane (1988). Seven years ago biologists studying Parachute penstemon recommended that if stringent steps were not taken for the conservation of this plant within five years, the plant should be listed under the ESA. Spackman *et al.*, CNHP (1997), Discussion and Recommendations. The Service, which already recognizes that a listing is warranted as evidenced by the plant's candidate status, should not wait to list until one or more populations are destroyed from existing land use threats, or until mounting habitat threats become even more severe. Based on the present and threatened destruction of the plant's habitat alone, the Service is required to list Parachute penstemon as threatened or endangered and must act swiftly.

B. Overutilization for commercial, recreational, scientific, or educational purposes

This second factor is unequivocally met and thus establishes that the Service is required to list Parachute penstemon as threatened or endangered. A significant threat of overutilzation is posed by the collection of wild Parachute penstemon seeds for gardening use and distribution by nurseries. Such seed collection can rob a plant of seed it needs to reproduce successfully in the wild. Penstemons are a favorite garden plant for many enthusiasts and, for a plant known only from five locations such as Parachute penstemon, seed loss and other damage during seed collection could constitute a serious threat. Several other rare edaphic endemic Penstemon species are grown easily in the garden setting. O'Kane and Anderson (1987).

The North American Rock Garden Society, with 35 local chapters in Canada and America, lists *Penstemon debilis* as a "Garden Collected" seed available in their seed exchange program; the original seed source for this line of plants, of course, came from the wild. North American Rock Garden website, Exchange – Garden Collected (visited Feb. 22, 2004) http://www.nargs.org/seed99/pageg27.html.

Some reports indicate that Parachute penstemon already has been grown as a garden plant in Colorado from seed collected in the wild. The fact that seed set for Parachute penstemon is low raises serious concerns regarding the potential impacts of such seed collection. With 13 being the highest average number of seeds set per fruit in a study of six breeding systems (McMullen (1998) at 44), any seed collection for off-site use could have adverse impacts.

In summary, the popularity of penstemons as garden plants, the existing trade in Parachute penstemon seeds, and the plant's low seed set all raise serious concerns regarding overutilization of Parachute penstemon for a garden plant.

C. Disease or predation

Parachute penstemon possibly meets this third listing factor, though more information is needed to determine the real extent of disease and predation.

1. Disease has been observed and may pose a threat

Though disease has not been recorded as a significant threat to Parachute penstemon, it cannot be ruled out since the cause of the decline of the Anvil Points Rim population remains unknown. Similarly, the reason that the transplants failed to thrive at this location is also unknown. When the Anvil Points Mine site was surveyed in 1997, botanists noted that about 10-20% of plants were diseased with spots/patches on leaves (though the eastern part of the population, consisting of much younger plants than the western portion, had very little evidence of disease). CHNP, EOR (2003). Also, some disease may exist at the Mount Callahan West site, where botanists noted that some plant leaves had a disease or herbivory. CHNP, EOR (2003). Research is needed to diagnose the disease that has been observed and to gauge the magnitude of threat that it poses, and determine the reason(s) for decline of the Anvil Points Rim population.

2. Predation in the form of herbivory has been observed and threaten Parachute penstemon

There appears to be some herbivory and possible predation on the plants. At the Mount Callahan East site, botanists noted herbivory on a small percentage of individuals. CHNP, EOR (2003). At the Mount Callahan West site, botanists noted that some plant leaves had a disease or herbivory. CHNP, EOR (2003). At the Anvil Points Rim site, botanists noted evidence of herbivory on the leaves of one individual. CHNP, EOR (2003). Also at this site, surveyors in 1996 "observed several large black ants going into flower."

The likelihood of cattle herbivory is limited primarily by the steepness of the population sites, and also by the lack of vegetation and water. However, cattle tracks have been seen within at least one Parachute penstemon population (NatureServe (2003), *citing* McMullen (in prep)). However, if the sites become populated with invasive plants as plants spread from reclaimed well pad sites, herbivory by cattle could increase where access allows.

Although predation does not currently appear to be a significant threat, certainly any herbivory from grazing must be carefully monitored and controlled.

D. Inadequacy of existing regulatory mechanisms

This factor is unequivocally met and thus establishes that the Service is required to list Parachute penstemon as threatened or endangered. There are no enforceable regulatory mechanisms in place to protect the private populations, and to the extent that the BLM has direction from its Manual or its plans to protect rare plants, it is not being followed and/or is ineffective.

1. Federal regulatory mechanisms are clearly inadequate to protect the Parachute penstemon

As reported on the Service's Candidate and Listing Priority Assignment Form, "Parachute [penstemon] has little or no Federal regulatory protection at either of its two known locations." U.S. Dep. of Interior, FWS (2002). The populations referred to here are apparently Mount Callahan East (private) and Anvil Points Rim (BLM). Though one additional private land population and two additional BLM populations have been discovered since this was written, Federal regulatory protections at these sites also fail to protect the plants.

At the two private populations found on Occidental Oil land, including Mount Callahan East, which is perhaps the most important population for the survival of the species, there is no regulatory protection whatsoever.

At the three BLM populations, adequate protections are not in place and, in the absence of ESA protection, the federal agencies are quite clearly unable or unwilling to provide appropriate protection from existing land uses, rapidly encroaching oil and gas development, the possibility of a resumption of oil shale mining, and other impacts. For a discussion of the shortcomings of provisions for candidate species, *see* § VI(A); for a discussion of the inadequacy of the Glenwood Springs Field Office's current plan as it relates to oil and gas development, *see* § VII(A)(1). In addition to these inadequacies, there are no BLM Areas of Critical Environmental Concern designated to protect any of the BLM populations, and BLM Manual direction on candidate species is not being seriously implemented – for example no BLM conservation plans have been drafted, and there is no work toward recovery of the plant (*see* § VI(A)(2)).

2. Colorado has no state regulatory mechanisms for protecting rare plant species

No state laws or regulations exist that protect any of the Parachute penstemon populations. Colorado does not have any laws or regulations intended to protect rare plants. The only plant that receives protection from the state of Colorado is the state flower, the columbine (*Aquilegia coerulea*). The only state agency that has taken responsibility for protecting and monitoring rare plants (including Parachute penstemon) is the Colorado Natural Areas Program; unfortunately this agency was gutted by the Colorado legislature in 2001 and funding for the program has tentatively been completely deleted from the 2004 budget. Although this program produces conservation benefits, on private lands it is limited to strictly voluntary agreements which means that, even when fully funded, it is insufficient to protect and accommodate recovery of the Parachute penstemon.

3. There are no other regulations protecting Parachute penstemon

No other regulations or enforceable management programs, such as might exist at the county level, protect Parachute penstemon.

4. The Mount Callahan Natural Area designation is ineffective to definitively protect the portion of the one Parachute penstemon subpopulation it encompasses from destruction and extirpation

As discussed above, there is a 360 acre Mount Callahan Colorado Natural Area that encompasses most of the Mount Callahan East population. The Colorado Natural Areas Program (CNAP) coordinates natural area protection throughout Colorado. CNAP (1996). This Natural Area is identified for the attributes "Plant Community" and "Special Status Plants," and the conservation vehicle is a "CNAP Designated: Voluntary Conservation Agreement." *Id.*

While the CNAP effort is to be commended, the program fails to ensure protection for this subpopulation in two central ways. First, the Natural Area appears to include most but not all of the Mount Callahan East population (a portion of the population is located in a section other than the one that contains the Natural Area). Second, the conservation vehicle is a "CNAP Designated: Voluntary Conservation Agreement" (CNAP, 1996), which means that any conservation protections are strictly voluntary on the part of the landowner. The CNAP web page explains that "CNAP does not purchase property; *all agreements are voluntary and non-binding.*" CNAP website, *About Us* (visited Feb. 21, 2003) http://parks.state.co.us/cnap/Generalinfo.html (emphasis added).

The fact that any protections are "strictly voluntary" means that they could be abandoned at any time. The Articles of Designation allow for either party to terminate the Agreement provided it notifies the other party 90 days in advance and gives it an opportunity to confer. Colorado Natural Areas Program 1987. If oil shale mining becomes economically advantageous, if conventional oil and gas drilling is planned, or if the land is sold to another party, the Natural Area protections could disappear. While such voluntary protection is commendable, it is well established that voluntary habitat protections cannot provide the basis for a decision not to list a species under the ESA. *Oregon Natural Resources Council v. Daley,* 6 F.Supp.2d 1139 (D. Or. 1998) (National Marine Fisheries Service acted contrary to the evidence in deciding not to list Oregon coho salmon and improperly based its decision on future and voluntary habitat protection and restoration actions.)

5. Summary: existing regulatory mechanisms are completely ineffective at protecting Parachute penstemon

There are no federal, state or other regulatory mechanisms that are adequately protecting Parachute penstemon. To the extent that the BLM has direction from its Manual or its plans to protect rare plants, it is not being followed and/or is ineffective. Based on this analysis, the Secretary is required to list Parachute penstemon.

E. Other natural or man-made factors affecting the species' continued existence

This factor is unequivocally met and thus establishes that the Service is required to list Parachute penstemon as threatened or endangered.

1. The extremely limited range, small number of plants found at most populations, and the small number of populations makes Parachute penstemon extremely vulnerable to extirpation

Parachute penstemon occupies an extremely narrow range, with only five confirmed populations, most very small, existing in two distinct complexes. Using the plant numbers (including estimates for populations where only rosettes have been counted) from Table 1 (p. 26), fewer than 750 plants are known from all five populations. These facts make Parachute penstemon extremely vulnerable to extinction.

The following table shows the most recent plant numbers for each population.

Table 2: Plant numbers for each population.

	Mt. Callahan East	Mt. Callahan West	Mt. Logan	A. Pts. Rim	A. Pts. Mine	Total Plant Numbers
Number of plants	388 "clumps" 300-400	300 "individuals" 19 to 300 plants	3	0 originals + 10 transplants	31 to 43	438 to 731

For the source of these numbers, see Table 1 on p. 26.

Most of the five populations consist of under 50 plants each, and two of those have only five or fewer plants. Neither of the two populations that may have greater than 50 plants have more than 400. Given these very low population numbers, Parachute penstemon is quite clearly at-risk from both anthropogenic impacts and from natural stochasticity.

a) Parachute penstemon is extremely vulnerable to anthropogenic impacts due to its limited range, the small number of plants, and the small number of populations

Any of the three populations with a very small numbers of plants (five to around 40), could be eliminated from one of the land use and management threats described above, even from a single action taken in a single day. For example, one road maintenance action could wipe out one of these small populations. Given that there are only five known populations, and the original plants at one these (Anvil Points Rim) appear to have already been lost, any additional population losses would be potentially devastating for the species.

b) Parachute penstemon is extremely vulnerable to demographic, environmental, and genetic stochasticity due to its limited range, the small number of plants, and the small number of populations

Even without taking into account the numerous threats listed above, Parachute penstemon is in a delicate and highly vulnerable position due to the small size of most of its populations. There is a substantial body of literature on the risks that small populations face for a wide variety of reasons. Gilpin and Soulé (1986); Lande (1987). Stochastic or random events pose a great threat to small populations because they often simply do not possess the resources to recover. Three main forms of stochasticity have been recognized as increasing extinction risk: demographic, environmental, and genetic. Brussard and Gilpin (1989); Miller *et al.* (1996); Vucetich and Waite (1999). These factors often work synergistically. Vucetich and Waite (1999). As Lacy (1997: 329) states, "Genetic instability and decline can cause demographic instability and decline, and greater susceptibility to environmental fluctuations and catastrophes. Demographic fluctuations and catastrophe-caused bottlenecks can in turn cause more genetic instability and depletion of genetic variation." Parachute penstemon is vulnerable to each of these three forms of stochasticity.

i) Demographic stochasticity

Demographic stochasticity encompasses random events influencing individual birth and death rates. Brussard and Gilpin (1989); Lande (1995). Demographic factors that can vary randomly include "sex ratio, age of first reproduction, number of offspring, distribution of offspring over the lifetime of an individual, and age at death." Brussard and Gilpin (1989). Larger populations are less influenced by demographic stochasticity because the greater number of individuals decreases the relative importance of the contribution of any one individual to the structure of the population as a whole.

For example, the Anvil Points population is based on plants that were all transplanted as seedlings at the same time, and are thus all of the same age class. If they fail to produce progeny, this population may become extirpated as plants die from old age. Parachute penstemon's very limited range (a narrow band around 17.5 miles long), small number of populations, and low population size make the threat of such events very significant.

ii) Environmental stochasticity

Environmental stochasticity usually affects the death and birth rates of all the individuals in a given population in nearly the same way (Lande, 1995). Environmental uncertainty can include major disturbances like fires or epidemics, or less catastrophic factors like year-to-year weather fluctuations. Brussard and Gilpin (1989). Changes in climate, competition, disease, resource availability, and predation all may be considered forms of environmental stochasticity. Brussard and Gilpin (1989). Here population size is not as important as the number of extant populations and the extent of their geographic distribution, since entire populations are usually affected.

An example of environmental stochastic variation would be an unusually hard winter or an extended drought that kills numerous plants. With only five known populations, and one of those likely consisting of only a few off-site transplants, any loss of a population due to environmental stochasticity could have a severe effect on the plant's survival. In addition, Parachute penstemon's extremely limited global distribution increases the risk that all known populations could be subjected to the same environmental catastrophe at once.

iii) Genetic stochasticity

Small, fragmented, and isolated populations have fewer opportunities for genetic flow. Breeding partners are often limited to those found in the immediate area, and loss of fitness due to inbreeding depression can result. Lacy (1997:321) states:

> Inbreeding has been observed to cause higher mortality, lower fecundity, reduced mating ability, slower growth, developmental instability, more frequent developmental defects, greater susceptibility to disease, lowered ability to withstand stress, and reduced intra- and inter-specific competitive ability (Allendorf and Leary, 1986; Darwin, 1868, 1876; Falconer, 1989; Ledig, 1986; Lerner, 1954; Ralls *et al.*, 1988; Wright, 1977).

In many places, Parachute penstemon faces exactly those risks because its population size is as small as three, ten or forty plants. As the remaining populations decrease in size or are even lost, and the potential for gene flow is reduced and other fragmentation effects increased, the likelihood of extinction continues to grow. Noss (1983); Noss (1991); Noss and Cooperrider (1994); Harris (1984); Hastings and Harrison (1994); Soulé (1986); Soulé (1987).

McMullen (1998) conducted reproductive ecology research on by far the two largest populations (Mount Callahan East and West) that are also much closer together than are the Anvil Points populations (Mount Logan is roughly the same distance from Mount Callahan West as the two Mount Callahan populations are from one another). With regards to these two large, nearby Mount Callahan populations, there was some evidence for inbreeding depression occurring between crosses of near individuals. At. 26. Effects of inbreeding depression may be much more severe at the smaller and more isolated populations where the risk from genetic stochasticity and bottlenecks is even greater.

McMullen discusses the phenomenon of species becoming adapted to selfing by purging deleterious recessive alleles. *Citing* Lande and Schemske (1985); Charlesworth and Charlesworth (1990). Her research showed that reproductive of Parachute penstemon success was much lower when plants were pollinated with their own pollen, which suggests that it still largely relies on pollinators and outcrossing rather than having made this adaptation.

c) Summary: Parachute penstemon is vulnerable due to its limited range, the small numbers of plants, and small numbers of populations

In sum, small populations are *extremely* vulnerable to extinction by way of all these mechanisms. Parachute penstemon's extremely small aggregate population indicates that all of the above processes combine to create imminent, high-magnitude threats to this subspecies. One population, Anvil Points Rim, has already been lost. These risks need to be considered in addition to and in concert with the particular threats outlined above.

2. Disruptions to plant-pollinator interactions or degradation of pollinator nesting habitat could result in declines of Parachute penstemon

Pollination studies of Parachute penstemon were conducted by Amy McMullen in 1997 and 1998 as part of her Master of Science thesis work. McMullen (1998). This research found that Parachute penstemon is "primarily an outcrossing species, and that few fruit were produced by self-fertilization within a flower or between flowers on the same plant." *Id.* at 87. The plant was found to require a pollinator "to set a significant amount of fruit." *Id.*

The research found that Parachute penstemon is pollinated by native bees, with differences in pollinator assemblages between populations. *Id.* at 27, 32-35. Temporal variation was also noted, with 1998 visitation rates showing considerable variation between days as well as between the Anvil Points Mine site and the two Mount Callahan sites. *Id.* at 28.

At the two Mount Callahan sites, *Osmia brevis* was found to be the primary pollinator, and bumblebee species (*Bombus* spp.) were also observed. *Id.* at 27. In addition several species were collected at these sites in 1998 that were either not collected at all in 1997, or not found in abundance, including *Osmia grindelia, O. bruneri,* and *Atoposmia elongata*. *Id.*

In contrast, the Anvil Points Mine site supported a pollinator community where *O. bruneri* and *Atoposmia elongata* were the dominant insect visitors, *O. cobaltina* (not found at Mount Callahan at all) and *O. grindelia* were collected in large numbers, and a large wasp, *Pseudomasaris vespoides,* was abundant. *Id.* at 28. *Osmia brevis* was also found at the Anvil Points Mine site, but no *Bombus* species. *Id.*

None of the major pollinators have been described as specialists on Parachute penstemon, though the wasp collected at the Anvil Points Mine site and some of species of the *Osmia* genus are considered *Penstemon* specialists. *Id.* (citing several sources omitted here). At the time of her research and at the sites she studied (Mount Callahan East, Mount Callahan West, and Anvil Points Mine), pollinators were not found by McMullen to be limiting Parachute penstemon reproduction. *Id.* at 87. It would be interesting to repeat this study at the much smaller populations found at Mount Logan and Anvil Point Rim.

Osmia brevis, the primary pollinator observed at the two Mount Callahan populations, is believed to be a ground nester because it has never been trapped in 25 years of intensive trap

nesting by the U.S. Dep. of Agriculture's Bee Biology and Systematics Lab in Logan, Utah. *Id.* at 35. Regarding other *Osmia* species that pollinate Parachute penstemon, while nesting preferences of some *Osmia* species are unknown, it is known that some species "build their nests in wood and stems, on rocks, and in the ground (Hurd 1979)." Tepedino *et al.* (1999). For example, *Osmia bruneri* makes is known to make nest holes in stems or at other sites with preexisting holes. Frolich (1983); Michener (2000). *Atoposmia elongata* constructs nests of clumps of cells of sand and masticated plant material in rock crevices. Michener (2000), *citing* Parker (1977a).

More generally, the genus *Osmia* contains 500 species, and all are solitary bees. Bosch *et al.* (2001). A recent study of solitary bees found that they have a rather small foraging range making local habitat structure very important to the bees. Regarding reproduction of solitary bees, the study found that several resources, including "species-specific nest sties, specific materials for nest construction, nectar sources to maintain the activities of the adult bees and pollen as the essential component of the larval food" to be critical. *Id.* (internal citation omitted).

Given that the reasons for the spatial and temporal variation of Parachute penstemon's pollinator assemblages is not known, maintenance of the entire suite of pollinators should be a goal of conservation planning the species. McMullen (1998) notes that the "maintenance of the entire suite of pollinators should be considered important to the long-term reproductive success of *P. debilis.*" At 33. Conserving these pollinators with tools such as No Surface Occupancy stipulations, restrictions on road maintenance activities, no surface disturbances, and no off-road vehicle use will be critical.

Tepedino *et al.* (1999) studied the pollinators of *Penstemon penlandii*, a rare endemic penstemon of the Colorado Plateau that, like Parachute penstemon, was found to have numerous different pollinators. They comment "[t]hat over 20 species pollinate *P. penlandii* should evoke guarded optimism rather than complacency," and that "[i]t is the land manager's responsibility to foster such redundancy." At 51. They advocate for managing for the welfare of the entire pollinator guild by "concentrat[ing] on eliminating or mitigating anthropogenic sins of commission by taking an ecosystem management approach (Tepedino *et al.* 1997)." *Id.* Controlling pesticide spraying near the plant's habitat and protecting nesting sites are the two measures they identify. Regarding protection of nesting sites, they note that "persistent or widespread disturbance of soil and vegetation by off-road vehicles, road construction, wood-gathering, or overgrazing may negatively impact nesting sites of these pollinators (Sugden 1985). Efforts should be made to avoid or mitigate such disturbances." At 51-52.

There is currently no protection of nest locations for Parachute penstemon's pollinators, but such protection will likely be a critical piece of providing for the continued existence of Parachute penstemon.

3. Parachute penstemon does not respond well to cultivation and transplanting

An issue of concern is the difficulty that was experienced in trying to cultivate Parachute penstemon from seed and plant it in what appeared to be suitable habitat. Of the 53 plants that were germinated from Mount Callahan East and transplanted as seedlings to the Anvil Points Rim site in 1998, only ten were alive in 2002 (U.S. Dep. of Interior, Scheck, 2002), and of those maybe only five will survive. Pers. comm. Carla Scheck (2004a). When examined in 2002, all transplants appeared to be "very weak and diminutive," and nine out of the ten did not appear any larger in above-ground vegetative growth than when first transplanted. U.S. Dep. of Interior, Scheck (2002).

Additionally, the low seed set for Parachute penstemon means that there is not a large source of wild seed to support a propagation program. In a study of six breeding systems, the highest average number of seeds set per fruit was 13 (standard deviation = 5.68), resulting from the xenogamy at 10-m (intermediate). McMullen (1998) at 44.

These facts indicate that efforts to restore populations or establish new populations with cultivated transplants are not likely to be very successful if at all. This highlights the importance of protecting existing populations and suitable habitat where the plant may become naturally established.

4. Over 90% of the plants in the five known populations are found on private lands and receive no protection

Lastly, Parachute penstemon faces serious risk of extirpation due to the ownership of the lands on which its few populations exist, and the importance of the populations located on private land. Over 90% of all plants are found on private land owned by an oil company, and populations found on private land account for two out of the five known, or 40%.

Table 3: Percentage of plants found on private versus public land.

	Number of Plants	% of plants not including transplants	% of plants including transplants
Private land	407 to 688	90 to 96%	89 to 94%
BLM	31 to 43 originals + 10 transplants	4 to 10%	6 to 11%

For the source of these numbers, see Table 1 on p. 26.

This data shows that Parachute penstemon is in a precarious position due to the ownership distribution of its plants and populations. This distribution alone is cause for serious concern regarding the future persistence of this species.

In contrast to Parachute penstemon, Dudley Bluffs Bladderpod (*Lesquerella congesta*) and Dudley Bluffs Twinpod (*Physaria obcordata*), oil shale endemics which the Service listed as threatened in 1990, were found almost entirely on land managed by BLM. 55 Fed. Reg. 4152, 4153 (Feb. 6, 1990) (Final Listing). All five populations of each species were located on BLM lands, with the exception that a portion of one population of each species overlapped with Colorado Division of Wildlife land (bladderpod) and private land (twinpod). *Id.* The ownership pattern of the Parachute penstemon populations, combined with existing and potential threats, show that the listing criteria are easily met here.

Currently, Occidental Oil (or any party to whom the company might sell the land) could legally strip mine these plots with no regard for the plant. While the current lack of regulatory mechanisms to protect the plants found on private lands is alarming, perhaps even more alarming is that even a listing as threatened or endangered under the ESA will provide limited benefits to the plant populations on private land. This underscores the critical importance of ESA protection for the BLM populations.

5. Summary: multiple other natural and man-made factors threaten Parachute penstemon and require the Secretary to list

Threats to Parachute penstemon due to its limited range, small number of plants, small number of populations, reliance on unprotected pollinators and inhabitation of private lands require the Secretary to list. Further, existing evidence shows that the plants transplant poorly which increases the importance of protecting existing populations.

F. Summary of why the Secretary is required to list Parachute penstemon under the ESA

Only one factor needs to be met to require a listing, and here we have demonstrated that four factors are met (A, B, D, E), while one is perhaps met but needs more study (C). Parachute penstemon is an extraordinarily rare plant that is facing multiple threats. Over 90% of the plants are found on private oil company land where they are completely unprotected, one BLM population consists only of off-site transplants, one BLM population has a road going through it that the BLM has not closed, part of another BLM population is in an area already leased for oil and gas, and all of the populations face mounting threats from accelerated oil and gas development.

The Secretary must list the Parachute penstemon as either threatened or endangered under the ESA because, as detailed in the preceding discussion, analysis of the five listing factors shows that the species is "in danger of extinction throughout all or a significant portion of its range" (50 C.F.R. § 424.02(e)) or at least "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 50 C.F.R. § 424.02(m). Thus the Service is required to list Parachute penstemon as threatened or endangered.

VII. SUBSTANTIAL BENEFITS WILL RESULT FROM AN ESA LISTING FOR PARACHUTE PENSTEMON

The benefits of ESA listing for Parachute penstemon are substantial:

- Listing will require that federal agencies enter into Section 7 consultation with the Service, and carefully consider the potential impacts to this plant from ongoing and proposed activities under their jurisdictions. The result will be significantly improved protection on federal lands from recreational oil, gas, and mineral extraction, grazing and trampling damage, roads, off-road vehicle use, noxious weeds, and other human disturbance, in the form of a proactive approach to implementing conservation actions prior to opening Parachute penstemon habitat to development.

- Projects involving a federal nexus will also require Section 7 consultation; therefore the benefits of listing may extend to populations occurring on non-federal lands as well.

- The designation of critical habitat will result in significant additional protection not only for occupied habitat but also for other habitat areas deemed essential to the recovery of the species. The ESA prohibits adverse modification of designated critical habitat.

- Listing will result in the development of a recovery plan aimed at biological recovery (and delisting).

- Listing will help spur research (and the required scientific interest and funding) aimed at improving our understanding of the threats facing the Parachute penstemon and the steps required for its biological recovery. This research may further the recovery of other imperiled species as well.

- Listing will establish a ban against removing and reducing to possession those plants found on lands under Federal Jurisdiction.

- Listing will provide a series of trade prohibitions including a ban on selling or offering to sell Parachute penstemon in interstate or foreign commerce (exempting seeds from cultivated specimens of threatened plants provided that certain conditions are met). This is critical given the demonstrated interest in Parachute penstemon as a garden plant.

- Listing will increase the availability of federal funds for private land initiatives that would protect Parachute penstemon.

The most ambitious (and arguably unlikely) scenario involving state and federal agencies adopting their own conservation measures in the absence of a listing would, at best, result in the reduction of threats to Parachute penstemon, not an elimination of those threats and certainly not

biological recovery. So long as the Parachute penstemon remains in such small numbers and faces such threats it will be at a high risk of extinction. There is no precedent for the State of Colorado or the BLM adopting and implementing a conservation strategy resulting in the biological recovery of a highly imperiled plant. The record of State measures indicates that a conservation plan that involves the state taking active and effective conservation measures is highly unlikely. Thus listing is the critical step that must be taken to preserve Parachute penstemon.

VIII. RECOVERY NEEDS OF PARACHUTE PENSTEMON

Conserving and recovering Parachute penstemon will require several steps. Activities related to oil, gas, and mineral extraction must avoid occupied and suitable (for recovery) Parachute penstemon habitat. This cannot be emphasized enough given the very sizable oil and gas resources underneath all of the populations of this plant and the rapidly increasing efforts to develop these resources. Grazing impacts in Parachute penstemon habitat must be reviewed, and management should change accordingly. Areas above and near to occupied and suitable Parachute penstemon habitat should be closed to off-road vehicle use. The spread of noxious weeds and the activities that facilitate their spread need to be carefully managed. Population monitoring should take place range-wide. Seeds may need to be collected and stored for conservation purposes. The habitat of Parachute penstemon pollinators must be investigated, and protection must be provided for the plant's assemblages of pollinators that have been identified, including nesting sites.

Finally, the protection and recovery of sufficient habitat to ensure long-term persistence, including providing for the dispersal and movement of the species through time and for the continued unfolding of natural ecological processes and changing climate patterns, must be ensured. Listing Parachute penstemon under the ESA is a critical step toward the protection and full biological recovery of this species.

IX. THE SECRETARY MUST PROMULGATE AN EMERGENCY LISTING RULE FOR PARACHUTE PENSTEMON

The Secretary is required to "make prompt use" (16 U.S.C. § 1533(b)(3)(C)(iii)) of her authority to issue temporary listing rules in the event of "any emergency posing a significant risk to the well being of any species of fish or wildlife or plants." 16 U.S.C. § 1533(b)(7). Such "prompt use" is to occur in order "to prevent a significant risk to the well being of any such species." 16 U.S.C. § 1533(b)(3)(C)(iii).

The emergency that Parachute penstemon faces is the rapidly accelerating oil and gas development throughout its highly limited range, including at the location of each of its five populations, in addition to ongoing threats from recreation, noxious weeds, grazing, and other factors described above. Despite the fact that the Service formally recognized that Parachute penstemon warranted a listing proposal eight years ago, placing it on the candidate list, there are no regulatory mechanisms in place that adequately protect the plant from these significant risks to its well being.

It is clear that current regulatory mechanisms are not adequate to protect this highly imperiled endemic wildflower from extinction, and the magnitude and imminence of the threats involved require immediate attention; irrevocable harm will likely occur in the period of time (usually multiple years) expended during the standard, non-emergency listing process. Therefore, petitioners petition the Secretary to promulgate an emergency listing rule immediately, concurrent with the initiation of the standard, non-emergency listing process.

X. CRITICAL HABITAT SHOULD BE DESIGNATED AT TIME OF LISTING

The ESA requires the Secretary to designate "critical habitat" for listed species based on certain factors. 16 U.S.C. § 1533(b)(2). The ESA implementing regulations state that "[c]ritical habitat shall be specified to the maximum extent prudent and determinable at the time a species is proposed for a listing." 50 C.F.R. § 424.12(a). In the case of Parachute penstemon, under this standard, critical habitat must be specified concurrent with the listing proposal.

Existing knowledge about the plant's current distribution and habitat needs make critical habitat determinable at the time of listing. Designating critical habitat is unlikely to appreciably increase risks to the Parachute penstemon in part because the habitat and distribution of the Parachute penstemon are already well known and, also, because a proper critical habitat designation, including recovery habitat, will be broad enough to avoid highlighting with great precision the few remaining populations. Moreover, the benefits of critical habitat are considerable. Critical habitat imposes a higher protective standard ("no adverse modification of habitat") than does listing alone ("jeopardize the continued existence") and, furthermore, includes unoccupied habitat essential for recovery of the species. Designating critical habitat is especially important here because it is clear that areas in addition to the locations of existing populations must be protected for the species to persist. Consequently, the benefits of designating critical habitat for the Parachute penstemon far outweigh the risks. Thus specification of critical habitat concurrent with the listing proposal is both determinable and prudent.

XI. MAKING A 90-DAY PETITION FINDING REGARDING THIS PETITION IS HIGHLY PRACTICABLE

The ESA requires that the Secretary "make a finding" within 90 days after receiving this petition, to the maximum extent practicable, "as to whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted" 16

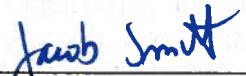
U.S.C. § 1531(b)(3)(A). In the case of Parachute penstemon, making such a finding in 90 days is highly practicable because the listing factors are so strongly met and there is not voluminous material about the plant to work through. Furthermore, the Service has formally recognized that a listing proposal is warranted since at least 1996 when the plant was placed on the candidate list.

XII. CONCLUSION

The Parachute penstemon unequivocally warrants listing under the provisions of the ESA. Moreover, without ESA protection, the Parachute penstemon is likely to suffer a permanent and irreversible extinction. Parachute penstemon exists at only five known locations, with the two largest populations occurring on private land held by an oil company. Each population faces a variety of significant and mounting threats, including the rapidly accelerating oil and gas activity slated for the area where this plant is found. It is highly likely that Parachute penstemon will only survive if given the protection offered by an ESA listing as threatened or endangered.

This petition and accompanying materials provide substantial scientific and commercial information indicating that Endangered Species Act listing for Parachute penstemon (*P. debilis*) may be warranted, and that promulgation of an emergency listing rule is appropriate. We appreciate your prompt attention to this petition, and look forward to receiving both an immediate formal acknowledgment of its receipt, and a decision within 90 days of its receipt.

Respectfully submitted this 15th day of March, 2004,



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