DRAFT ENVIRONMENTAL ASSESSMENT
PROPOSAL OF CRITICAL HABITAT
FOR *IPOMOPSIS POLYANTHA* (PAGOSA SKYROCKET), *PENSTEMON DEBILIS* (PARACHUTE BEARDTONGUE), AND *PHACELIA SUBMUTICA* (DEBEQUE PHACELIA) IN COLORADO

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Introduction

The U.S. Fish and Wildlife Service (Service) is proposing to designate critical habitat for *Ipomopsis polyantha* (Pagosa skyrocket), *Penstemon debilis* (Parachute beardtongue), and *Phacelia submutica* (DeBeque phacelia) in Colorado. *I. polyantha* was listed as endangered under the Endangered Species Act of 1973 as amended (ESA), on July 27, 2011 (76 FR 45054). At this same time *P. debilis* and *P. submutica* were listed as threatened. On this same date, we published our proposal for designating critical habitat for these three species (76 FR 45078). Critical habitat designation is required by the ESA for listed species. This Draft Environmental Assessment (DEA) presents the purpose of and need for the critical habitat designation, the proposed action and alternatives, and an evaluation of the direct, indirect, and cumulative effects of the alternatives pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA) as implemented by the Council on Environmental regulations (40 CFR 1500, et seq.) and according to the U.S. Department of Interior NEPA procedures. This DEA will be used by the Service to help decide whether critical habitat will be designated as proposed, if the proposed action requires refinement, or if further analysis is needed through preparation of an Environmental Impact Statement (EIS).

1.0 Purpose for the Proposed Action

The purpose of the proposed action is to designate critical habitat for *Ipomopsis polyantha*, *Penstemon debilis*, and *Phacelia submutica* in Colorado by utilizing provisions of the ESA. The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend. Critical habitat designation identifies areas that contain the physical and biological features essential to the conservation of these three plant species and that may require special management or protection. The designation also describes the physical and biological features essential to the conservation of these plants known as the Primary Constituent Elements (PCEs).

2.0 Need for the Action

The need for this action is to comply with section 4 of the ESA, which requires that critical habitat be designated for endangered and threatened species unless such designation is not prudent. A final listing rule (76 FR 45054) published on July 27, 2011, designated *Ipomopsis polyantha* as endangered throughout its range and designated *Penstemon debilis* and *Phacelia submutica* as threatened throughout their range. At this same time, critical habitat was proposed for all three species (76 FR 45078).

When the range of a species includes States within the Tenth Circuit, pursuant to the Tenth Circuit ruling in Catron County Board of Commissioners v. U.S. Fish and Wildlife Service, 75 F .3d 1429 (10th Cir. 1996), we will complete an analysis pursuant to NEPA on critical habitat designations. The range of these three species is entirely within the State of Colorado, which is within the Tenth Circuit.

Critical habitat is one of several provisions of the ESA that aid in protecting the habitat of listed species until populations have recovered and threats have been minimized so that the species can

be removed from the list of threatened and endangered species. Critical habitat designation is intended to assist in achieving long-term protection and recovery of these three plant species and the ecosystems upon which they depend. Section 7(a)(2) of the ESA (50 CFR §402.13) requires consultation for Federal actions that may affect critical habitat to avoid destruction or adverse modification of this habitat. Further explanation of critical habitat and its implementation is provided below.

Below we describe the threats and a description of the life history and habitat parameters for each of these three species. For a further analysis of the threats please see our final listing rule (76 FR 45054). For further descriptions of how we used life history and habitat characteristics to determine the essential physical and biological features for the plants, please see our proposed critical habitat designation (76 FR 45078).

2.1 Background – *Ipomopsis polyantha* (Pagosa skyrocket)

Species Description

Ipomopsis polyantha is an herbaceous biennial 12 to 24 inches (in.) (30 to 60 centimeters (cm)) tall, branched from near the base above the basal rosette of leaves. Deeply divided leaves with linear segments are scattered up the stem. Stems and flower clusters are covered with glandular hairs. Flower clusters are along the stem in the axils of the leaves as well as at the top of the stem. The white flowers are 0.4 in. (1 cm) long, with short tubes 0.18 to 0.26 in. (0.45 to 0.65 cm) long, and flaring lobes flecked with purple dots (Anderson 1988). These dots are often so dense that they give the flower a pinkish or purplish hue. The stamens extend noticeably beyond the flower tube, and the pollen is blue (Grant 1956), changing to yellow as it matures (Collins 1995). The species is in the Polemoniaceae (phlox) family.

Geographic Range

Ipomopsis polyantha is limited Mancos shale from the Upper Cretaceous period. The soil pH is nearly neutral to slightly alkaline (6.6 to 8.4). The elevation range is 6,750 to 7,775 feet (ft) (2,050 to 2,370 meters (m)). The two known occurrences of *I. polyantha* are within 13 miles (mi) (21 kilometers (km)) of each other, and collectively occupy about 388 acres (ac) (157 hectares (ha)) of habitat within a range that includes about 6.5 square mi (16.8 square km). The Pagosa Springs occurrence is southeast of the Town of Pagosa Springs along both sides of U.S. 84. Occupied habitat extends southward on the highway ROW for 3 mi (4.8 km) from the intersection with U.S. 160, and on private lands on both sides of the highway. The Dyke occurrence is about 10 mi (16 km) west of Pagosa Springs along U.S. Highway 160. It includes 0.5 mi (0.8 km) of highway ROW on both sides of U.S. 160, adjacent private land, and a BLM parcel.

Ecology and Life History

Seeds form a mucilaginous (secreting mucilage, sticky) coat after they are wet. Seeds germinate much faster in Mancos Shale soil than in potting soil (Collins 1995). Mature seeds germinate to

form rosettes that produce flowering stalks during the next growing season, or they may persist as rosettes for 1 or more years until conditions are right for flowering. Plants produce abundant fruits and seeds, but have no known mechanism for long distance dispersal (Collins 1995). After seeds are mature, the plants dry up and die. We do not know how long the seeds remain viable.

Ipomopsis polyantha sets far less fruit when self-pollinated (2 to 9 percent fruit set [self-pollinated] versus 47 percent fruit set in the presence of pollinator[s]) (Collins 1995). Also, male and female reproductive parts are separated both spatially and temporally (Collins 1995). Therefore, we conclude that pollinators are necessary for the long-term successful reproduction and conservation of the plant. Over 30 different insects have been collected visiting *I. polyantha* flowers (Collins 1995). The primary pollinators are all bee species; these include the nonnative honeybee (*Apis mellifera*) and native bees that nest in the ground or twigs including species of *Augochlorella* (a type of Halictid or sweat bee), *Anthophora* (digger bees), *Bombus* (bumblebee), *Dialictus* (another type of Halictid or sweat bee), *Megachile* (leafcutter bees), and *Lasioglossum* (another type of Halictid or sweat bee) (Collins 1995). Most of these pollinators are solitary and do not live communally. Pollinator diversity was higher at *I. polyantha* sites with more complex plant communities (Collins 1995).

Habitat

Ipomopsis polyantha is found on barren shales, or in the open montane grassland (primarily *Festuca arizonica* (Arizona fescue)) understory at the edges of open *Pinus ponderosa* (Ponderosa pine), *Pinus ponderosa* and *Juniperus scopulorum* (Rocky Mountain juniper), or *J. osteosperma* (Utah juniper) and *Quercus gambellii* (oak) plant communities (Anderson 2004). Within these plant communities, the plant is found in open or more sparsely vegetated areas where plant cover is less than 5 or 10 percent, although these interspaces can be small within the greater plant community (less than 100 ft^2 (10 m^2)). Because the plant is found in these open areas it is thought to be a poor competitor. Dense stands of nonnative invasive grasses such as *Bromus inermis* (smooth brome) appear to almost totally exclude the species (Anderson 2004). Anderson (1988) reported finding the highest densities under *P. ponderosa* forests with montane grassland understory. Now the species is found mostly on sites that are infrequently disturbed, such as road right-of-ways (ROWs) that are fenced from grazing (as opposed to open range), lightly grazed pastures, and undeveloped lots (Anderson 2004).

Complexity in *Ipomopsis polyantha* plant communities is important because pollinator diversity at *I. polyantha* sites is higher at more vegetatively diverse sites (Collins 1995). Given that much of the area where *I. polyantha* currently exists has already been altered to some degree, these plant communities may be historical. For example, the adjacent forest that would have naturally occurred in *I. polyantha* habitat may have been thinned or removed. In another example, forage species may have been planted in habitat that was once more suitable for *I. polyantha*.

Ipomopsis polyantha is found on Mancos shale soils from the Upper Cretaceous period. These shales comprise a heavy gray clay loam alluvium (loose, unconsolidated) derived from shale, sandstone, clay, and residuum that is unconsolidated, weathered mineral material that has accumulated as consolidated rock and disintegrated in place (Collins 1995). These shale soils do

not retain soil moisture and are difficult for plant survival. *I. polyantha* seeds grow best when germinated in these Mancos shale soils (Collins 1995). We assume the soils where *I. polyantha* are found are among the harshest local sites for plant growth because of the lack of vegetation at occupied sites, and because the soils are heavy, droughty, and deficient in nutrients. Species that occupy such sites have been called "stress-tolerators" (Grime 1977).

The native habitat of *Ipomopsis polyantha* has been extensively modified (Anderson 2004). The species is considered a ruderal species, which means it is one of the first plant species to colonize disturbed lands. Seeds are not thought to disperse far. Plants are able to colonize nearby disturbed areas quickly. The species is found in light to moderately disturbed areas, such as rills (small, narrow, shallow incisions in topsoil layers caused by erosion by overland flow or surface runoffs), areas that are only occasionally disturbed, or areas with previous disturbances that have been colonized and not subsequently disturbed (i.e., previously cleared areas that have had some time to recover) (Anderson 2004; 76 FR 45078). Some of these disturbances are now maintained or created by human activities (such as light grazing or the recolonization of Mancos shale substrate roads that are no longer used) that mimic the constant erosion that occurs on the highly erosive Mancos shale soils and seem to maintain *I. polyantha* at a site. *I. polyantha* sites with constant or repetitive disturbance, especially sites with constant heavy grazing or repeated mowing, have been lost (Mayo 2008b). Fire also may have played a role in maintaining open habitats and disturbances for *I. polyantha* in the past (Anderson 2004), as it historically did in all Ponderosa pine forests across the West (Brown and Smith 2000).

Interestingly, *Ipomopsis polyantha* individuals at newly disturbed sites were slightly more likely to self-pollinate than were plants in later successional areas (Collins 1995), demonstrating that disturbance is important enough to *I. polyantha* that it may influence reproductive success (self-pollinated individuals are less reproductively successful) and possibly genetic diversity (self-pollination leads to lowered genetic diversity). Managing for an appropriate disturbance type and/or level can be difficult since we lack research to better quantify these measures.

Threats

Ipomopsis polyantha is threatened with destruction of plants and habitat due to commercial, residential, municipal, and agricultural property development, and associated new utility installations and access roads. We have documented recent losses of habitat and individuals within the Pagosa Springs and Dyke occurrences of the species, as described in more detail below.

Primary land use within the range of *Ipomopsis polyantha* has historically been livestock (horses or cattle) grazing, with homes on parcels of 35 ac (14 ha) or more. Several small businesses now occur along U.S. 84 within the Pagosa Springs occurrence. The intersection of U.S. 160 and U.S. 84 is zoned by the Town of Pagosa Springs for business, and commercially zoned land is currently available for development. Archuleta County also is considering sites in this area for new county buildings. These current and potential conversions of agricultural lands to residential and commercial development are incompatible with conservation of *I. polyantha* in

the long term because they cause direct mortality and permanent loss of habitat. Conversely, habitat modified by grazing may be recovered by changes in management.

Residential development is increasing in Archuleta County. The population of Archuleta County was 5,000 in 1990, increasing to 12,430 in 2009 (U.S. Census U.S Census Bureau 2011). Prior to the slowing down of the real estate market over the past few years, projections for new development in Archuleta County were high. For example, all private land across the entire range of *Ipomopsis polyantha* is scheduled for development (Archuleta County 2000). In this plan, all areas occupied by *I. polyantha* on private land outside of the Town limits are planned for low (35 ac (14 ha)), medium (3 to 35 ac (1.2 to 14 ha)), or high (2 to 5 ac (0.81 to 2 ha)) density housing. The rate of current and proposed development is the most significant threat to the species.

Utilities installations and construction activities that are necessary for development can eliminate habitat and destroy *Ipomopsis polyantha* plants. During 2005 and 2006, a sewer line installation on the U.S. 84 ROW resulted in the loss of about 498 plants and 541 rosettes, and the modification of about 1,473 ft (449 m) of roadside habitat (Mayo 2008a). The Colorado Department of Transportation (CDOT) and Archuleta County worked with the Service, and agreed on avoidance measures for this project, but contractors failed to follow the protocol. Where avoidance of plants and habitat was specified , topsoil, plants and rosettes were scraped away on the bank; where native plant seeding was specified, nonnative grasses were seeded; and where straw was prohibited, a thick layer of straw was applied (Holst 2006; Peterson 2006). As a result, in 2008, the remaining 8 flowering plants and 5 rosettes at this site were found in one spot, near plants on an adjacent property not disturbed by the sewer line project (Mayo 2008a). In 2010, the combined number of flowering plants and rosettes at the site was 167. This incident demonstrates that *I. polyantha* cannot quickly recover from soil disturbance. Although *I. polyantha* can colonize unvegetated Mancos Shale soil near a seed source, the number of flowering plants that appear in subsequent years depends on seed production and the survival of rosettes that are not outcompeted by other species or destroyed during ground disturbance. Power line maintenance was completed within occupied habitat in the Pagosa Springs occurrence in 2007. As a result of careful planning, there was negligible damage to adult plants. However, 278 rosettes were transplanted, but did not survive to reproduce for unknown reasons. We conclude that the species is highly vulnerable to ground disturbance during development because seedlings and rosettes are destroyed and transplanting is not known to be successful.

The Archuleta County and Town of Pagosa Springs revised 2004 Trails Plan (Archuleta County and the Town of Pagosa Springs 2004) calls for an 8 ft (2.4 m) wide, 2.5 mi (4 km) long, paved bike path on the highway ROW from U.S. 160 south along U.S. 84 in occupied *Ipomopsis polyantha* habitat. This route, prioritized for completion as soon as funding is available, would eliminate about 38 percent of the total occupied habitat on the highway ROWs and 4 percent of the total occupied habitat for the species. Another planned paved bike trail, parallel to U.S. 160 and through the Dyke occurrence of *I. polyantha*, is on the low priority list in the Trails Plan (Archuleta County and the Town of Pagosa Springs 2004). Development of this bike trail would eliminate the portion of the Dyke occurrence located on the south side of the highway where the trail would be located, covering about 3 percent of the total highway ROW habitat.

The distribution of *Ipomopsis polyantha* within highway ROWs makes this species susceptible to threats associated with highway activities and maintenance. Exotic grasses planted by CDOT along roadsides dominate the ROW between pavement and ditch, limiting most *I. polyantha* plants to the ROW bank between ditch and fence. This limitation to the species' habitat along roadsides is significant because so little habitat exists elsewhere for the species. *I. polyantha* plants growing within the highway ROW along U.S. 84 in 2004 were killed when the thistles growing among them were treated with herbicide (Anderson 2004). Since that time, Archuleta County has discontinued broadcast herbicide use and mowing on ROWs within the species' range. However, the planted exotic grasses continue to limit the species' habitat.

Highway ROWs provide about 9 percent of the occupied habitat for *Ipomopsis polyantha*. All highway ROW habitat is at risk of disturbance by construction of new access roads or acceleration lanes, bike paths, and utilities installation or maintenance. Such construction results in direct loss of *I. polyantha* individuals or reduced suitability of its habitat by altering the soil characteristics (Anderson 2004).

This species is threatened by destruction of flowering plants, rosettes, and seeds due to concentrated livestock disturbance and some herbivory. Observations of the "fence line effect"—healthy plants outside the fence and impacted plants inside the fence—at several locations on private land used for cattle and horse grazing indicate that *Ipomopsis polyantha* does not tolerate intensive livestock grazing (Anderson 2004). For example, grazing by horses at a residential/agricultural development within the Pagosa Springs occurrence in 2005 resulted in few *I. polyantha* plants 3 years later (Mayo 2008b). Over-the-fence observations from seven locations (pastures) in 2009 found few or no plants in the three heavily grazed pastures and numerous plants in the adjacent pastures with light or no grazing (Mayo and Glenne 2009). We do not know whether the destruction of the plants was a result of herbivory or trampling. *I. polyantha* is not found in heavily grazed pastures, but occurrences have been observed in lightly grazed horse pastures and abandoned pastures (CNAP 2007). Plants could possibly recolonize a pasture if livestock numbers were reduced sufficiently and the seed bank was still viable, or if there was a seed source nearby, such as on the ungrazed side of a fence. Indications are that the species may persist in areas with light grazing, but the level of impact and the threshold of species' tolerance have not been studied. Few plants persist in areas of continual grazing (Collins 1995).

The suite of existing regulatory mechanisms that could potentially offer some protection to *Ipomopsis polyantha*, including the Federal Land Policy and Management Act (FLPMA), and State and local laws are inadequate to protect the species. Ninety-seven percent of the known range of the species is on State, Town, and private lands thereby affording little to no protection on these lands. Federal statutes and regulations governing natural resource protection apply only to 2.5 percent of the occupied habitat and therefore can do little to influence the overall status of the species. The State of Colorado offers no regulatory protection to plants, which means that protection falls upon local County and Town ordinances. The planning regulations governing growth in Archuleta County and the Town of Pagosa Springs do not contain any requirements to protect rare plants, including *I. polyantha*, when siting new growth and

development. In fact, the current county planning regulations contribute to the risk of extinction for the species by facilitating development in the last remaining habitat occupied by the species.

Habitat changes as a result of climate change could potentially impact *Ipomopsis polyantha.* Localized projections indicate the southwest United States may experience the greatest temperature increase of any area in the lower 48 States (IPCC 2007). A 10 to 30 percent decrease in precipitation in mid-latitude western North America is projected by the year 2050, based on an ensemble of 12 climate models (Milly *et al.* 2005). Climate modeling at this time has not been refined to the level that we can predict the amount of temperature and precipitation change within the limited range of *I. polyantha*. Therefore, this analysis is speculative based on the data available at this time. When plant populations are impacted by reduced reproduction during drought years, they may require several years to recover. Climate change may exacerbate the frequency and intensity of droughts in this area and result in reduced species' viability as the dry years become more common. As described above, *I. polyantha* is sensitive to the timing and amount of moisture due to its biennial life history. Thus, if climate change results in local drying, the species could experience a reduction in its reproductive output.

Recent analyses of long-term data sets show accelerating rates of climate change over the past 2 or 3 decades, indicating that the extension of species' geographic range boundaries towards the poles or to higher elevations by progressive establishment of new local occurrences will become increasingly apparent in the short term (Hughes 2000). The limited geographic range of the Mancos Shale substrate that underlies the entire *Ipomopsis polyantha* habitat likely limits the ability of the species to adapt by shifting occurrences in response to climatic conditions.

2.2 Background – Penstemon debilis

Species Description

Penstemon debilis is a mat-forming perennial herb with thick, succulent, bluish leaves, each about 0.8 in. (2 cm) long and 0.4 in. (1 cm) wide. Plants produce shoots that run underground, forming what appear as new plants at short distances away. The funnel-shaped flowers are white to pale lavender, and bloom during June and July. Traditionally, the genus *Penstemon* was included in the Scrophulariaceae (figwort) family. However, *Penstemon* is now considered to be within the Plantaginaceae (plantain) family due to recent research using DNA sequences (Oxelman *et al.* 2005).

Geographic Range

Penstemon debilis is a rare plant, endemic to oil shale outcrops on the Roan Plateau escarpment in Garfield County, Colorado. The historical range and distribution for this species is unknown. All of the currently known occurrences occupy about 91.8 ac (37.2 ha) on the Green River geologic formation in Garfield County, Colorado. Although this formation is underground throughout most of the Piceance Basin, it is exposed on much of the southern face of the Roan Plateau, to which the plant is restricted. The total area of the plant's geographic range is about 2

mi (3 km) wide and 17 mi (27 km) long. Six occurrences of *P. debilis* were found between 1986 and 2005, two of them are no longer viable (CNHP 2012). It is likely that unknown occurrences exist, because many areas are inaccessible to surveyors due to cliff side terrain or private land ownership or both.

The occurrences on Bureau of Land Management (BLM) land represent about 19.4 percent of the total plants counted and approximately 33.3 percent of the occupied habitat. A new Smith Gulch location on BLM land has been added to the Mt. Callahan Saddle occurrence because it is on shale deposited at the base of the cliffs directly below the saddle (Graham 2009). Oxy USA Inc. owns land that contains 68.9 percent of the total plants on 39.8 percent of the occupied habitat, with agreements directing management of lands under their control. The Oxy oil shale division owns land with 11.6 percent of the plants on 26.9 percent of the occupied habitat, with no management agreements. We refer to OXY USA Inc. and Oxy oil shale collectively as Oxy in this document.

Ecology and Life History

Penstemon debilis is found on steep oil shale slopes that are constantly shifting. The plant has underground stems (rhizomes) that are an adaptation to this constant shifting (McMullen 1998). As the shale shifts downward, the underground stems and clusters of leaves emerge downhill. A single plant may actually appear as many different plants that are connected by these underground stems (McMullen 1998). In sites where the soils have stabilized and vegetation has encroached, *P. debilis* has been extirpated (lost) (McMullen 1998).

Penstemon debilis plants produce a small number of seeds that are dispersed by gravity. *P. debilis* requires insect pollinators for reproduction and is twice as reproductively successful if pollen comes from another plant (McMullen 1998). Over 40 species of pollinators have been collected from *P. debilis*; the primary pollinators include four *Osmia* (mason bee) species, *Atoposmia elongata* (a close relative of *Osmia*), several *Bombus* (bumblebee) species, and a native wasp *Pseudomasaris vespoides*. All of these pollinators are ground or twig nesting. None of these pollinators are rare, nor are they specialists on *P. debilis*, although some of these pollinators, such as *Osmia*, are specialists within the genus *Penstemon* (McMullen 1998). The number and type of pollinators differ between *P. debilis* sites (McMullen 1998). Fruit set is not limited by inadequate numbers of pollinators (McMullen 1998).

Toxic elements in the soil such as arsenic and selenium accumulate in the tissues of *Penstemon debilis* (McMullen 1998) and may allow *P. debilis* to grow in areas that are more toxic to other species thereby reducing plant competition. Toxic elements in the soil vary between populations. Soil morphology, rather than soil chemistry, appears to better explain the plant's distribution (McMullen 1998).

Genetic diversity in all populations of *Penstemon debilis* surveyed is very limited and there is very little contact among the populations, which indicates inbreeding depression (Wolfe 2010). There is a close genetic relationship between the two Mount Callahan populations, the Anvil

Points populations are also clustered together, and the Mount Logan population is intermediate between the other groups (Wolfe 2010).

Habitat

Penstemon debilis is found on steep, constantly shifting shale cliffs with little vegetation. The decline or loss of several populations has been attributed to encroaching vegetation; therefore, it is assumed that *P. debilis* is a poor competitor (McMullen 1998). The areas where *P. debilis* are found are characterized as "Rocky Mountain cliff and canyon" (NatureServe 2004). The plant community where *P. debilis* is found is unique, because instead of being dominated by one or two common species as most plant communities are, it has a high diversity of uncommon species that also are oil shale endemics (McMullen 1998). These uncommon species include *Mentzelia rhizomata* (Roan Cliffs blazingstar), *Thalictrum heliophilum* (sun-loving meadowrue), *Astragalus lutosus* (dragon milkvetch), and the somewhat more common *Lesquerella parviflora* (Piceance bladderpod), *P. osterhoutii* (Osterhout's beardtongue), and *Festuca dasyclada* (Utah or oil shale fescue) (McMullen 1998). More common species include *Holodiscus discolor* (oceanspray), *P. caespitosus* (Mat penstemon), *Cercocarpus montanus* (Mountain mahogany), and *Chrysothamnus viscidiflorus* (Yellow rabbitbrush) (O'Kane and Anderson 1987; McMullen 1998).

Penstemon debilis is known only from oil shale cliffs on the Roan Plateau escarpment and was previously described as occurring only on the Parachute Creek Member of the Green River Formation (McMullen 1998). Our mapping exercises have found that the plant also is found on the Lower Part of the Green River Formation (Tweto 1979). Populations are generally located either directly above or below the geologic feature known as the Mahogany Ledge (McMullen 1998). All occupied sites are similar in soil morphology (form and structure) and are characterized by a surface layer of small to moderate shale channers (small flagstones) that shift continually due to the steep slopes (McMullen 1998). Below the channers is a weakly developed calcareous, sandy to loamy layer with 40 to 90 percent coarse material.

Known populations of *Penstemon debilis* are found from 5,600 to 9,250 ft (1,700 to 2,820 m) in elevation (Service 2011a). *P. debilis* is generally found only on steep slopes (mean of 37 percent slope) and between cliff bands where the oil shale is constantly shifting and moving downhill (Service 2011a). The plant also can be found on relatively flat sites, although nearby habitats are often steep

Threats

Penstemon debilis habitat is threatened by energy development and associated impacts. Of the four known viable occurrences (Mt. Callahan and Mt. Callahan Saddle Natural Areas, Anvil Points Mine, and Mt. Logan Mine), all but the Anvil Points Mine occurrence are on lands wholly or largely owned by energy development companies. All four viable occurrences face ongoing or potential threats, including: oil and gas development, oil shale extraction and mine reclamation, road construction and maintenance, and vehicle access through occurrences.

The Mt. Callahan and Mt. Callahan Saddle Natural Area occurrences, which include approximately 68.9 percent of the total known *Penstemon debilis* plants on 39.7 percent of the occupied habitat, occur on land owned by Oxy. These occurrences are behind locked gates, making them inaccessible to the public. Oxy has developed two natural gas well drilling pads within a 680 ac (275 ha) area that includes both occurrences (Webb 2008). One pad is located 360 ft (110 m) from the nearest known *P. debilis* individual and 105 ft (32 m) uphill from its habitat (Ewing 2008). The other pad is located farther from the habitat, where runoff will flow down the opposite side of the ridge. Operation of these wells could potentially impact *P. debilis* by dust generation, loss of pollinator habitat, spills of produced water or other drilling wastes, and inadvertent trampling by employees and contractors. Monitoring of the occurrences, in connection to the energy development, has resulted in trampling of individual plants by people collecting the data (Ewing 2009a).

To protect plants and habitat from potential impacts, Colorado Natural Areas Program (CNAP) and Oxy have agreed to Best Management Practices and conservation measures, to include plant surveys, surface disturbance buffers, designated travel routes, handling of produced wastes, dust abatement, a monitoring plan for the plants, and weed management.

Working with Oxy, CNAP has designated the areas of Mt. Callahan and Mt. Callahan Saddle as State Natural Areas (CNAP 1987; CNAP 2008; Webb 2008). Through these designations, Oxy has agreed to develop natural gas pads in a way that will avoid or minimize impacts to the *P. debilis* occurrences (Ewing 2008). The agreements include conservation measures such as storm water management and a noxious weeds management plan (CNAP 2008). CNAP has been very successful in garnering landowner participation in conservation of rare species in Colorado. The plant habitat on the natural areas appears unmodified by the gas well pad activity. Trampling of plants during monitoring has been noted as a minor impact that will be minimized in the future by modifying the sampling methods.

The Smith Gulch location of an estimated 50 plants was discovered on BLM lands below the Mt. Callahan occurrences at the base of the cliffs during surveys for a proposed oil and gas development project in June 2009 (Graham 2009). Two well pads, and corresponding roads and pipelines, were proposed for this area (Graham 2009). Following an environmental assessment, two well pads were permitted, to be located about 6,400 ft (1,950 m) away from the plants. The pads have not been built as of February 2012 (DeYoung 2012). When development proceeds, we anticipate no significant impacts to the plants unless they get washed down the drainage into the gas well area, which we cannot predict.

Oil and gas exploration and development continues to increase each year on both private and BLM lands on and around the Roan Plateau, where all of the known *Penstemon debilis* populations are found. In Garfield County, 566 new wells were permitted in 2003; 796 in 2004; 1,508 in 2005 (Colorado Oil and Gas Conservation Commission - COGCC 2006); 1,844 in 2006; 2,550 in 2007 (COGCC 2008); and 2,888 in 2008 (COGCC 2009). Because of a decrease in natural gas prices, new well permits decreased in 2009 to 743 (COGCC 2009; Webb 2009), but increased again to 1,887 in 2010, the highest for a county in Colorado after Weld County (COGCC 2010).

Energy exploration and development activities include construction of new unpaved roads, well pads, disposal pits, evaporation ponds, and pipeline corridors, as well as off-road travel by employees. Each of these actions has the potential to cause direct impacts to *Penstemon debilis*, such as plant removal and trampling, and indirect impacts, such as dust deposition and loss of habitat for pollinators. Because *P. debilis* was unknown as a species until 1987, and the occurrences are on private land or in remote locations on public land, the impacts may go unnoticed. For example, impacts to the Mt. Logan Mine occurrence were unknown until the occurrence was recorded in 2005. Even after the discovery, further mine-related impacts occurred because most of the plants were on oil shale company land, making it difficult for BLM to manage the occurrence (Ewing 2009a; Colorado Natural Heritage Program (CNHP) 2012).

Road traffic on unpaved roads increases dust emissions on previously stable surfaces (Reynolds *et al.* 2001). For every vehicle traveling 1 mi (1.6 km) of unpaved roadway once a day, every day for a year, approximately 2.5 tons of dust are deposited along a 1,000-ft (305-m) corridor centered on the road (Sanders 2008). Vascular plants can be greatly affected within the zone of dust fall (Walker and Everett 1987). Excessive dust may affect photosynthesis, affect gas and water exchange, clog plant pores, and increase leaf temperature, leading to decreased plant vigor and growth (Farmer 1993; Sharifi *et al.* 1997; Ferguson 1999). Because the viable occurrences of *P. debilis* are within 300 ft (91 m) of roads, well within the zone of maximum dust fall, they are all likely to be affected by decreased ability to photosynthesize, impaired gas and water exchange, clogged pores, and decreased plant vigor and growth. However, traffic volume and speed and dust generation within 300 ft (91 m) of the plants is currently likely to be low, slow and sporadic, because reclamation and pad/road construction within the occurrences is mostly, but not entirely, completed. Dust levels could increase at any time depending on the amount of energy development in the vicinity.

Other indirect impacts to *Penstemon debilis* can occur due to loss of pollinator habitat. *P. debilis* requires an insect pollinator to reproduce (McMullen 1998). Prior to the energy boom, McMullen (1998) concluded that pollinators for *P. debilis* were generalists and were not limiting at that time. However, Tepedino (2009) described the ways in which the pollination biology of another Piceance Basin rare plant, *Physaria obcordata* (Dudley Bluffs twinpod), is impacted by energy development. He described that any energy development that reduces the general level of available floral vegetation has a detrimental effect on pollinators' ability to reproduce, because fewer flowers provide less nectar to feed the pollinators, subsequently resulting in fewer pollinators and reduced ability of the dependent plant, such as *P. debilis,* to produce seeds (Tepedino 2009).

A large parcel of land including habitat occupied by both Anvil Points occurrences was leased by the BLM for oil and gas development in August 2008 (BLM 2008; DeYoung 2008). This proposed development is described in the Roan Plateau Resource Management Plan (RMP) Amendment, which is still being contested in court by environmental groups (Williams 2010). Increased energy exploration in the Anvil Points Mine area may increase maintenance and vehicle access on the unstable road that transects the *Penstemon debilis* occurrence and increase the likelihood of impacts to *P. debilis* due to construction of additional roads and other facilities

associated with oil and gas exploration. Despite ongoing disturbances, Anvil Points Mine is the largest occurrence on federally managed land. If impacts continue to modify or curtail this habitat, the species is likely to become endangered.

Oil shale mining has likely impacted *Penstemon debilis* occurrences. Access roads for the mines at Anvil Points and Mt. Logan were cut across cliff sides occupied by the plants, displacing the loose shale habitat and destroying plants. Oil shale extraction activities occurred on the Roan Plateau in the early 1980s and into the 1990s (ColoradoBiz 2008). Because *P. debilis* was not identified as a species until 1987, we have no record of the pre-mining occurrence status. However, we believe the plants were present at these sites prior to mining because some are still present now. The plants were likely heavily impacted by mine operations within their habitat, and we think that the occurrences are likely to have recovered to a smaller population size on a reduced area of habitat.

Commercial oil shale extraction has not yet proven to be economically viable, and current research and development efforts no longer focus exclusively on surface mining of oil shale rock on the Roan Cliffs (ColoradoBiz 2008). In November 2008, the BLM issued its Record of Decision approving Resource Management Plan Amendments to allow oil shale leasing in the Piceance Basin (BLM 2007). The known *Penstemon debilis* occurrences are not within the area that BLM has currently identified as available for oil shale leasing (BLM 2007). It is unknown when oil shale extraction will become economically viable. If commercial oil shale production does become economically viable, we expect a renewed interest in extracting shale from the cliffs of the Roan Plateau because the shale is located conveniently near the surface.t

Recent impacts to the Anvil Points Mine plants occurred due to energy production research and removal of core samples by an oil shale research and development company (discussed below), and at the Anvil Points Mine and Mt. Logan Mine occurrences due to mine reclamation and closure efforts (DeYoung 2009b; DeYoung 2009a). The BLM conducted mine reclamation actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. 9601 *et seq*.), commonly known as Superfund, to remove health and safety hazards from Anvil Points Mine. Actions included closing access to the passages leading into the mine and removing lead mine tailings soil on the mine bench (Goodenow 2008). It is unknown whether the lead in the soil is a threat to *Penstemon debilis*. An estimated 350 plants were on the mine bench where the reclamation was done (CNHP 2012). Eighty-eight plants are known to have been directly impacted by Anvil Points Mine reclamation actions permitted by BLM during 2008-2009 (DeYoung 2009b; Bennett 2010). Of the 88, 21 plants that would have been crushed by heavy equipment were transplanted, 56 were covered by matting intended to reduce soil disturbance (DeYoung 2009b; DeYoung 2009c), and 11 plants were either covered with tires or screened from human activities with construction fencing (Bennett 2010). As of December 2009, 17 of the 88 plants were either dead or unaccounted for (Bennett 2010). Any loss of plants at Anvil Points Mine is a threat to the species because of the small size of the entire population, but we expect fewer disturbances at the site now that reclamation is completed.

The BLM also allowed an oil shale research and development company to conduct research in the Anvil Points Mine, a project area containing the Anvil Points Mine occurrence (Ewing 2008).

This research consisted of taking high resolution photographs of the geologic formation visible from the sides of the mine, and removal of stored core samples. The project included vehicle trips up the road every day for 1 month and directly impacted *Penstemon debilis* individuals growing in the road immediately outside the mine (Ewing 2008). The roads transecting the occurrence are on shifting shale talus slopes and are very conducive to rockslides and mudslides, which require the road to be maintained frequently. Three plants out of about 350 are known to have been destroyed by the road maintenance conducted under this permit (DeYoung 2009b). In addition to the direct impacts, the road maintenance required to allow this level of traffic made occupied *P. debilis* habitat more accessible to the public, which could result in further trampling by humans and vehicles (Ewing 2008).

The Mt. Logan Mine occurrence of *Penstemon debilis* is primarily located on land owned by Oxy oil shale division, with a portion of the occurrence occupying BLM land. This occurrence is perched on a steep, unstable slope above a road that is used for access to an oil shale mine reclamation project, and ongoing maintenance of the site. Plants were presumably removed to construct and maintain the road during past mining operations. Several plants out of 483 total on this steep road bank were dangling by their roots in 2005 due to road widening during reclamation (Mayo 2006). The road was widened further, and these plants were gone by 2006 (Mayo 2006). Mine reclamation actions destroyed about 30 of the 483 plants at another portion of this occurrence by burying them in topsoil (Ewing 2009a). This site also contains noxious weeds associated with the disturbance; although it is unknown whether the weeds will pose a threat to *P. debilis* (Ewing 2009a). The BLM portion of this occurrence was included in an oil and gas lease parcel nominated for sale; however, BLM deferred the sale of the lease parcel until completion of their RMP revision (now scheduled for May 2013) and until the Service publishes a determination concerning the status of the species (Lincoln 2009). We believe that the 483 plants counted at this occurrence are a remnant of a larger population that existed prior to mining and reclamation activities. The potential for further loss of plants at this location is an ongoing threat that could contribute to the species becoming endangered within the foreseeable future.

The Anvil Points Mine occurrence also is impacted during road stabilization work by Garfield County, which is done to maintain ongoing access to a communications transmitter tower located within occupied habitat for *Penstemon debilis* on the mine bench. We expect that continued vehicle access through the plant habitat will destroy a few plants at a time when vehicles turn around and workers walk on the shale slopes. Maintenance and use of the road prevents reclamation of the road bed, which would allow loose shale to cover the road and reclaim the plant habitat along the mine bench.

The Mt. Logan Road occurrence, located on the ROW above a heavily traveled road near the Logan Mine occurrence, had 10 plants in 1996, of which only 3 plants were found in 2005 and again in 2010 (CNHP 2012). This occurrence has no barriers to shield the plants from heavy dust generated by truck traffic (Ewing 2009a; CNHP 2012). As a result of these ongoing threats and the low number of plants at the site, we consider this occurrence to be nonviable.

In summary, three of the four viable occurrences (Mt. Callahan and Mt. Callahan Saddle Natural Areas and Mt. Logan Mine) are on lands owned wholly or partially by energy development

companies. Some individuals at the fourth occurrence (Anvil Points Mine), on BLM land, have been subject to transplanting or destruction as a result of a mine closure project and road maintenance. Over the past 6 years, oil and gas exploration and production has increased substantially in the area containing the habitat for *Penstemon debilis*, making it likely that the species will become endangered in the foreseeable future. The pace of new development slowed in 2009 because of a variety of factors, but increased again in 2010 (COGCC 2010). *P. debilis* grows on steep shifting slopes, and roads through *P. debilis* habitat are unstable and require frequent maintenance, which destroys plants. Plants seem to be able to recolonize their habitat after disturbance; however, recolonization is slow, and would not be able to keep pace with rapid development.

Penstemon debilis population sizes are small, and the smaller the population, the more likely extinction is in any given period of time (Ellstrand and Elam 1993; Holsinger 2000; Honnay and Jacquemyn 2007). All occurrences of *P. debilis* grow on a 17 mi (27 km) stretch of the rim of the Roan Plateau in Garfield County, Colorado (Ewing 2008). The two largest occurrences are within 2 mi (3 km) of each other (Ewing 2008). A species with such a small range is particularly susceptible to extirpation from a stochastic event such as a, rockslide, or severe hail storm (McMullen 1998). This increased susceptibility is due to the likelihood that, although stochastic events are often localized in severity, such a localized event would likely impact all occurrences of the species, rather than just a small portion of the occurrences, as may be expected for a species with a larger range. For example, the newly discovered Smith Gulch location is small (estimated 50 plants), and because of its positioning in a drainage, has a high potential for being destroyed by a rain event (DeYoung 2009c).

In addition, the fragmentation of *Penstemon debilis* habitat by human-related activities threatens to reduce the species to mosaics of small populations occurring in isolated habitat remnants. Foraging pollinators spend more time within large populations than small populations, so sensitive plant species with small populations are more likely to have a lower seed set per individual than do larger ones, and to suffer genetic problems such as genetic drift and inbreeding depression due to losses of individuals in such events such as those described in Factor A (Ellstrand and Elam 1993; McMullen 1998). Genetic diversity of *P. debilis* is low compared to other species of plants with similar life history traits (Wolfe 2010) and thus more susceptible to genetic problems.

Climate change could potentially impact *Penstemon debilis*. The limited geographic range of the oil shale substrate that makes up the entire *P. debilis* habitat could limit the ability of the species to adapt to changes in climatic conditions by progressive establishment of new populations.

2.3 Background – Phacelia submutica

Species Description

Phacelia submutica is a low-growing, herbaceous, spring annual plant with a tap root. The stems are typically 0.8 to 3 in. (2 to 8 cm) long, often branched at the base and mostly lying flat on the ground as a low rosette (Howell 1944, pp. 371-372). Stems are often deep red and more or less

hairy with straight and stiff hairs. Leaves are similarly hairy, reddish at maturity, 0.2 to 0.6 in. (5 to 15 mm) long, egg-shaped or almost rectangular with rounded corners, with bases abruptly tapering to a wedge-shaped point. Leaf margins are smooth or toothed. The tube shaped flowers are yellowish white, on short stems; the 5 petals are 0.16 to 0.19 in. (4-5 mm) long; the stamens do not protrude beyond the petals. The style is 0.04 to 0.06 in. (1 to 1.5 mm) long and nearly hairless, and the seed capsules do not have a short, sharply pointed tip (Howell 1944; Halse 1981). The elongated egg-shaped seeds are 0.6 to 0.8 in. (1.5 to 2 mm) long with 6 to 12 crosswise corrugations, and are blackish brown and somewhat iridescent (Howell 1944; Halse 1981; O'Kane 1987). *Phacelia* is included in the Hydrophyllaceae (waterleaf) family.

Geographic Range

The currently known occupied habitat where *Phacelia submutica* grows occurs on about 625.9 ac (253.3 ha) (CNHP 2012). About 80.9 percent of the occupied habitat is on lands managed by the BLM, 11.9 percent is on private lands, 6.4 percent is on lands managed by the USFS, and 0.7 percent is on lands managed by the Colorado Division of Wildlife (CDOW) (Service 2011b). A general range encompassing outlying occurrences of *P. submutica* includes about 82,231 ac (34,896 ha) (Service 2011b). The growing town of DeBeque and about 10 mi (16.4 km) of Interstate 70 and the Colorado River bisect the species' range.

Ecology and Life History

We do not yet understand the pollination and seed dispersal mechanisms of *Phacelia submutica*. Pollinators have not been observed visiting the flowers of *P. submutica*. Currently it is believed that pollinators may not be required for reproduction because of the minute flower size, a lack of obvious pollinators, and because the reproductive parts are hidden within the petals. We also do not understand how seeds are dispersed. Seed banks are established where seeds fall into the cracks of shrink-swell clay (O'Kane 1987; O'Kane 1988).

The natural shrink-swell cracking process creates the conditions needed for the plants and seed bank to thrive. *Phacelia submutica* seeds usually germinate in early April; the plants may flower between late April and late June. Fruit set is from mid-May through late June. Individuals finish their life cycle by late June to early July, after which time they dry up and disintegrate or blow away, leaving no indication that the plants were present (Burt and Spackman 1995). The species grows in a habitat with wide temperature fluctuations, long drought periods, and erosive saline soils. Upon drying, cracks form in the shrink-swell clay soils.

Plant sites differ in numbers of flowering plants each year, but there are no observations of site expansion. Seeds do not appear to disperse to adjacent soils. The ideal conditions required for seeds of this species to germinate are unknown.

It is likely that the number of seedlings depends not on total precipitation but on the temperature after the first major storm event of the growing season (Levine *et al.* 2008). *Phacelia submutica* seeds can remain dormant for 5 years (and probably longer) until the combination and timing of temperature and precipitation are optimal (CNHP 2012). Rare annuals that flower every year are

subject to extinction under fluctuating conditions, because they exhaust their seed reserves (Meyer *et al.* 2006). Rare ephemeral annuals that save their seed bank for the best growing conditions, are more resilient to fluctuating conditions. *P. submutica* numbers at Horsethief Mountain fluctuated from 1,700 plants in 1986, to 50 in 1992, up to 1,070 in 2003, and down to only a few from 2006 to 2008 (CNHP 2012). The fluctuation in numbers indicates that many seeds remain dormant in the seed bank during years when few plants can be found.

Habitat

Phacelia submutica grows only on barren clay soils derived from the Atwell Gulch and Shire members of the Eocene and Paleocene Wasatch geological formation (Donnell 1969; O'Kane 1987). The Atwell Gulch member is found below the bluish gray Molina member, and the Shire member is found above the Molina member (Decker *et al.* 2005). The plant is found in unique, very small areas (from 10 to 1,000 ft^2 (1 to 100 m^2)) on colorful exposures of chocolate to purplish brown, dark charcoal gray, and tan clay soils (Burt and Spackman 1995; Ladyman 2003; Grauch 2010). We do not fully understand why *P. submutica* is limited to the small areas where it is found, but the plant usually grows on the one unique small spot of shrink-swell clay that shows a slightly different texture and color than the similar surrounding soils (Burt and Spackman 1995). Ongoing species-specific soil analyses have found that the alkaline soils (with specific pH ranging from 7 to 8.9) where *P. submutica* are found have higher clay content than nearby unoccupied soils, although there is some overlap (Grauch 2010).

Predominant vegetation classifications within the occupied range of *Phacelia submutica* include clay badlands, mixed salt desert scrub, and *Artemisia tridentata* (big sagebrush) shrubland, within the greater *Pinus edulis* (pinyon)–*Juniperus* spp. (juniper) woodlands type (O'Kane 1987; Ladyman 2003). Within these vegetated areas, *P. submutica* is found on sparsely vegetated barren areas with total plant cover generally less than 10 percent (Burt and Spackman 1995). On these barren areas, *P. submutica* can be found alone or in association with other species. Associated plant species at sites occupied by *P. submutica* include: the nonnative *Bromus tectorum* (cheatgrass) and native species *Grindelia fastigiata* (pointed gumweed), *Eriogonum gordonii* (Gordon's buckwheat), *Monolepis nuttalliana* (Nuttall's povertyweed), and *Oenothera caespitosa* (tufted evening primrose) (Burt and Spackman 1995; Ladyman 2003). Many of these associated species also are annuals (growing for only 1 year). Because of the harshness and sometimes the steepness of occupied sites, these areas are maintained in an early successional state (Ladyman 2003). Therefore, the species found in these habitats are regarded as pioneers that are continually colonizing these bare areas and then dying (O'Kane 1987). Pioneer species are often assumed to be poor competitors (Grime 1977).

Known populations of *Phacelia submutica* occur within a narrow range of elevations from about 5,000 to 7,150 ft (1,500 to 2,175 m) (Service 2011a). *P. submutica* is found on slopes ranging from almost flat to 42 degrees, with the average around 14 degrees (Service 2011a). Plants are generally found on moderately steep slopes, benches, and ridge tops adjacent to valley floors (Ladyman 2003).

Threats

Phacelia submutica is threatened with destruction and modification of its seed bank and habitat due to the following issues: modification of areas for oil and natural gas exploration and production, development of the Westwide Energy Corridor, increased access to the habitat by off-road vehicles (ORVs), soil and seed disturbance by livestock and wild ungulates, and proposed water reservoir projects. All known occurrences are in the midst of the second largest natural gas producing area in Colorado (COGCC 2010).

About 78 percent of the habitat for the species and 67 percent of the entire range of *Phacelia submutica* are on BLM lands currently leased for oil and gas drilling (Ewing 2009b). An additional 65 ac (26 ha) of habitat (10 percent) may be opened to natural gas development by BLM pending development of a new RMP for the Grand Junction Field Office in 2013 (Robertson 2005; Ewing 2009b). About 3 percent of the habitat is on private land owned by energy companies (Burt and Spackman 1995). Although the sale of oil and gas leases by BLM does not directly impact rare plant habitat, it indicates the intention to continue and increase the level of development in an area that covers a large portion of the range of *P. submutica*. Likewise, the Colorado Oil and Gas Conservation Commission (COGCC) issues permits to drill that indicate imminent development at specific sites on private and Federal lands (COGCC 2009). COGCC issued ten new drilling permits in 2009. Within the range of *P. submutica*, there are 178 natural gas wells; 60 of these wells are located within the same 640 ac (259 ha) section as 18 of the 22 occurrences of the species (Ewing 2009b).

Five occurrences of *Phacelia submutica* are located on BLM land in an area called South Shale Ridge that covers more than a third of the known range for this species (Robertson 2005)(BLM 2005, p. 5). Part of South Shale Ridge is being recommended as an ACEC for protection of *P. submutica* in the upcoming Resource Management Plant. Portions of South Shale Ridge that were withheld from leasing in the past were leased for oil and gas development in November 2005 (Robertson 2005). These leases were subsequently deferred pending development of a new RMP for the Grand Junction Field Office (Robertson 2005; Ewing 2008). The new RMP is now scheduled for May 2013, and the leases are still on hold (Ewing 2011, pers. comm.). If the BLM sells these leases, then 8 ac (3 ha) of occupied *P. submutica* habitat within about 65 ac (26 ha) of suitable habitat will be newly opened to natural gas development in a previously undeveloped area (Ewing 2009b), with additional impacts anticipated from associated roads and related development.

Pyramid Rock is adjacent to South Shale Ridge, and the Pyramid Rock occurrence of *Phacelia submutica* is within the BLM Pyramid Rock ACEC, including an estimated 1 to 3,050 plants (depending on the year) within 214 ac (86 ha) of habitat (Wenger 2009; Wenger 2010; CNHP 2012). Stipulations of no new surface occupancy or ground disturbance apply to this ACEC for protection of candidate, proposed, and listed plant species. These stipulations do not apply to sensitive species. However, due to the possibility of exceptions being granted, we cannot predict with any degree of certainty what stipulations will actually be applied to the plant or its habitat that ensure the long-term conservation of the species. The BLM installed cable fence in 2007 to deter ORVs from crossing habitat for the federally threatened cactus *Sclerocactus glaucus* (Colorado hookless cactus) and *P. submutica*. Only a few ORVs have left tracks under the fence

and across *P. submutica* habitat. The BLM excluded this ACEC from a South Shale Ridge lease sale in 2005 (Robertson 2005). *P. submutica* plants have not been directly impacted since the fence was installed, and existing pipeline and roads remain outside the fence. The ACEC has provided adequate protection thus far for about 4 percent of the plants (See Table 3).

The Energy Policy Act of 2005 (42 U.S.C. 15801 *et seq*., p. 131) directed the Secretaries of Agriculture, Commerce, Defense, Energy, and Interior to designate energy transport corridors for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities on Federal lands. A portion of the designated Westwide Energy Corridor crosses 16,326 ac (6,621 ha) of BLM land within the range of *Phacelia submutica*. Nine of the species' 22 occurrences are located within this energy corridor (Ewing 2009b). Pipeline and transmission line routes along the energy corridor are not yet identified, but it is not feasible that all habitat for *P. submutica* will be avoided as the corridor continues to be developed.

Energy development activities described above are occurring in close proximity to *Phacelia submutica* locations (WestWater Engineering 2004). Oil and gas pipelines, well pads, and access roads are present on 11 *P. submutica* occurrences (CNHP 2012). Frequently travelled roads bisect and cross the edges of nine occurrences. It is likely that some of the seed bank was displaced or destroyed to build the roads and pipelines. On Federal lands, direct impacts to known plant locations are mostly being avoided by careful placement of pipelines, well pads, and associated facilities, due to the candidate status of the species. Our concern is primarily for the cumulative impacts of energy development. When all of the oil and gas wells are connected to the system of local pipelines, roads, and pumping stations, in combination with cross-country transmission lines and pipelines, more ROWs will be necessary. Under these conditions, it is difficult to protect occupied or potential habitat for *P. submutica*. The natural shrink-swell cracking process creates the soil conditions needed for *P. submutica* and its seed bank to thrive; however, the natural soil surface structure is fragile and easily disturbed. Blading of the top few inches of soil during well pad and road construction, installation of underground pipelines, and construction of associated buildings, holding tanks, and other facilities alter the unique soil structure, especially when it is wet, and may disturb, damage, or remove seed banks that are critical to the survival of this species. Any ground disturbance that churns or compacts the soil or changes the shrink-swell crack structure is likely to have a deleterious effect on the *in situ* seed bank and, therefore, on successful plant recruitment and survival of the species in subsequent years (Meyer *et al.* 2006).

Energy development increases access to previously roadless areas, which encourages ORV traffic to drive on nearby slopes that support plant habitat. The ORV use occurs on BLM lands in the general vicinity of *Phacelia submutica* and has been recorded within occupied habitat at seven occurrences (CNHP 2012). The vehicles stray from designated roads to climb hills for recreational purposes. Substantial surface disturbance due to churning by ORV tires can alter the unique soil structure required by this species, with the same negative effects on the seed bank as described above.

Trampling of the habitat by livestock and wildlife is documented at 14 of the 22 occurrences (CNHP 2012). Substantial surface disturbance due to heavy trampling increases soil compaction and erosion and alters the microhabitat, such as the cracked soil surface, the species requires.

Livestock-related impacts have resulted in the loss of similar plant species in other locations. *Lepidium papilliferum* (slickspot peppergrass) is a rare ephemeral annual desert plant in Idaho (comparable to *Phacelia submutica*), that has highly specific soil requirements and that depends on its seed bank. The peppergrass population dropped from thousands of plants in 1995 to no new plants after intensive trampling when the soil was wet and seeds were germinating (Meyer *et al.* 2005). The population has not recovered, which is believed to be due to damage and burying of seeds that prevented them from germinating. After 11 years of monitoring, researchers have clear evidence that "any form of soil disturbance is likely to have a deleterious effect on the *in situ* seed bank," and that all potential habitat for such a species (such as *P. submutica*) should be managed as if it were currently occupied (Meyer *et al.* 2005).

Two water reservoir projects known as Roan Creek and Sulphur Gulch have been proposed in the past within occupied habitat of *Phacelia submutica*. The potential reservoir locations would have impacted two occurrences. Recently, both projects were again evaluated as potential reservoirs to provide a water supply for in-stream flows for endangered fishes in the Colorado River (Friedel 2004; Grand River Consulting 2009). After evaluation of numerous alternatives, the Sulphur Gulch and Roan Creek projects are no longer being considered as a water supply for endangered fishes because more practical sources were found (Bray and Drager 2008; Grand River Consulting 2009). The Roan Creek reservoir project also was proposed by Chevron Shale Oil Company and Getty Oil Exploration Company to be used for development of oil shale extraction (Chevron Shale Oil Company and Getty Oil Exploration Company 2002), but the oil shale projects were not developed. These potential reservoirs could permanently destroy plants and their habitat by project construction and inundation. Since the proposals have been withdrawn, these threats are not imminent; however, the sites have been identified as potential reservoir locations that could be developed within 20 years if warranted by increased demands for water. Increased demands are likely, depending on the oil shale market, urban development in Colorado, and less precipitation due to climate change.

Climate change is likely to affect *Phacelia submutica* because seed germination, seed dormancy, and persistence of the seed bank are all directly dependent on precipitation and temperature patterns (Levine *et al.* 2008). Climate modeling is not currently to the level that we can predict the amount of temperature and precipitation change within the limited range of *P. submutica*.

Future changes in the timing of and temperatures associated with the first major spring rains each year may more strongly affect germination and persistence of ephemeral annual plants than changes in the amount of season-long rainfall (barring severe droughts) (Levine *et al.* 2008). Likewise, increasing environmental variance, such as an unusually wet spring, might decrease extinction risk for rare desert ephemeral plants, because they typically rely on extremely good years to restock the persistent seed bank, while extremely bad years have little impact (Meyer *et al.* 2006). A persistent seed bank enables the species to survive drought. However, extremely long droughts resulting from climate change, with no good years for replenishing the seed bank,

would likely cause *Phacelia submutica* to become endangered. Because the soil can remain bare of *P. submutica* plants for several years, it is difficult to identify and protect the seemingly unoccupied habitat that occurs in small, isolated patches that are easily destroyed by small-scale disturbances, and can be overlooked during habitat assessments. The longer the species remains dormant, the less likely it is that we will know if an area is occupied, reducing our ability to avoid impacts to the species and protect it from becoming endangered.

2.4 Endangered Species Act

2.4.1 Critical Habitat

Critical habitat is defined in section 3(5)(A) of the ESA as – (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. The term "conservation" as defined in section 3(3) of the ESA, means "to use and the use of all methods and procedures which are necessary to bring an endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (i.e., the species is recovered and removed from the list of threatened and endangered species).

Section 4(b)(2) of the ESA requires that we base critical habitat designation on the best scientific and commercial data available, taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. We may exclude areas from critical habitat designation if we determine that the benefits of exclusion outweigh the benefits of including the areas as critical habitat, provided the exclusion will not result in the extinction of the species. Within the geographic area occupied by the species, we will designate only areas currently known to be "essential to the conservation of the species." Critical habitat should already have the features and habitat characteristics that are necessary to sustain the species. We will not speculate about what areas might be found to be essential if better information were available, or what areas may become essential over time. If information available at the time of designation does not show that an area provides essential support for a species at any phase of its life cycle, then the area should not be included in the critical habitat designation. Within the geographic area occupied by the species, we will not designate areas that do not now have the physical and biological features that provide essential life cycle needs for the species.

Habitat is often dynamic, and species may move from one area to another over time. Furthermore, we recognize designation of critical habitat may not include all habitat eventually determined as necessary to recover the species. For these reasons, areas outside the critical habitat designation will continue to be subject to conservation actions that may be implemented under section 7(a)(1) and the regulatory protections afforded by the section 7(a)(2) jeopardy standard and section 9 protections, as determined on the basis of the best available information at the time of the action. We specifically anticipate that federally-funded or assisted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy

findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available to planning efforts calls for a different outcome.

In accordance with section 3(5)(A)(i) of the ESA and regulations at 50 CFR 424.12 in determining which areas to propose as critical habitat, we are required to base critical habitat determinations on the best scientific and commercial data available and to consider physical and biological features that are essential to the conservation of the species, and that may require special management considerations or protection. These include, but are not limited to (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing (or development) of offspring; and (5) habitats protected from disturbance or that are representative of the historic geographical and ecological distributions of a species.

2.4.2 Section 7 Consultation

Section 7(a)(2) of the ESA requires every Federal agency, in consultation with and with the assistance of the Secretary, to insure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. In fulfilling these requirements, each agency is to use the best scientific and commercial data available. This section of the ESA sets out the consultation process, which is further implemented by regulation (50 CFR 402).

Each Federal agency is to review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. If the action may affect a listed species or critical habitat, consultation with the Service is required.

Informal consultation is an optional process that includes all discussions and correspondence between the Service and a Federal agency or designated non-Federal representative, designed to assist the Federal agency in determining whether formal consultation or a conference is required. If during consultation it is determined by the Federal agency, with the written concurrence of the Service, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is terminated, and no further action is necessary. During informal consultation, the Service may suggest modifications to the action that the Federal agency and any applicant could implement to avoid the likelihood of adverse effects to listed species or critical habitat.

If the proposed action is likely to adversely affect a listed species or designated critical habitat, formal consultation with the Service is required. Formal consultation is a process between the Service and a Federal agency or applicant that (1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a Federal agency's request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion.

With the request to initiate formal consultation, the Federal agency is to include (1) a description of the proposed action; (2) a description of the area that may be affected; (3) a description of any listed species or critical habitat that may be affected; (4) a description of the manner in which the listed species or critical habitat may be affected and an analysis of cumulative effects; (5) relevant reports including any environmental impact statement, environmental assessment, or biological assessment; and (6) any other relevant and available information.

Formal consultation concludes 90 days after its initiation. Within 45 days after concluding formal consultation, the Service is to deliver a biological opinion to the Federal agency and any applicant. The biological opinion will include the Service's opinion on whether the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. If the action is likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat, the biological opinion will include a reasonable and prudent alternative, if any exist. A reasonable and prudent alternative is a recommended alternative action that can be implemented consistent with the scope of the Federal agency's legal authority and jurisdiction, that is economically and technologically feasible, and that would avoid the likelihood of jeopardizing the continued existence of the listed species or the destruction or adverse modification of designated critical habitat.

For animal species, in those cases where the Service concludes that an action (or the implementation of any reasonable and prudent alternatives) and the resultant incidental take of listed species will not violate section 7(a)(2), the Service will provide with the biological opinion a statement concerning incidental take that--(1) specifies the impact of the take on the species; (2) specifies the reasonable and prudent measures to minimize the impact; (3) sets forth terms and conditions that must be complied with by the Federal agency or any applicant to implement the reasonable and prudent measures; and (4) specifies procedures to handle any individuals actually taken. Reasonable and prudent measures, along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the actions and may involve only minor changes. Any "taking" covered in the incidental take statement and in compliance with the terms and conditions of the statement is not a prohibited taking under the ESA and no other authorization or permit under the ESA is required.

For plant species, there is no "take" and no incidental take statement is provided. Project effects are still evaluated and corresponding conservation actions/recommendations are still developed.

2.4.3 Technical Assistance

Although it is not defined in the regulations, technical assistance includes those parts of the informal consultation that provide information to agencies, applicants, and/or consultants, but specifically stops short of concurrence on "may effect" determinations. The term is used to differentiate "informal" consultation (where a concurrence with an agency, applicant, or consultant on "may effect" is provided) and the provision of information. This differentiation is primarily made for record-keeping purposes.

A telephoned or written inquiry about the presence or absence of listed and/or proposed species in a project area usually initiates informal consultation and frequently generates technical assistance. Service biologists may respond in different ways:

a) If species are not likely to be present, the consultation requirement is met and the Service may advise the agency, applicant or consultant.

b) If historical records or habitat similarities suggest the species may be in the area, then some survey work may be recommended to make a more precise determination.

c) If the species is definitely in the project area, but the Service determines it will not be adversely affected, the Service may notify the agency of that finding.

Technical assistance from the Service may take a variety of forms. It can include information on candidate species as well as names of contacts having information on State listed species. The Service may provide correspondence to State agencies or other Service offices to alert them to a project.

As a part of technical assistance, the Service may recommend:

a) That the action agency conduct additional studies on the species' distribution in the area affected by the action, or

b) That the action agency monitors impacts of the action on aspects of the species' life cycle. Monitoring may be recommended when incidental take is not anticipated, but might possibly occur, thus triggering the need for project changes or formal consultation.

2.4.4 Section 9 Prohibitions

Section 9 of the ESA prohibits removing and reducing to possession, or the malicious damage or destruction of endangered species of plants on Federal lands. The Service has issued regulations (50 CFR 17.71) that generally apply to threatened plants, very roughly extending the ESA prohibitions to threatened species.

2.4.5 Section 10 Permits

Under section 10(a)(1)(A) of the ESA, permits can be issued for any actions prohibited under section 9. These permits may be granted to enhance the propagation or survival of the affected species. Section 10(a)(1)(B) and section 7 incidental take permits are not needed for plants, but corresponding section 7 consultation is still done for permit issuance.

3.0 Description of Alternatives

This section describes the proposal for critical habitat for *Ipomopsis polyantha*, *Penstemon debilis*, and *Phacelia submutica*. Alternatives are different ways of meeting the purpose and

need for critical habitat designation as described in chapter one, which can be summarized as to provide protection of habitat that is essential to the conservation of listed species. In addition, we considered two potential alternatives without thoroughly examining the impacts of their implementation.

3.1 Alternatives Considered But Not Fully Evaluated

We considered critical habitat that did not include the entire range of *Ipomopsis polyantha*, *Penstemon debilis*, or *Phacelia submutica*. For both *I. polyantha* and *P. debilis*, both species were considered too rare to not include the entire range of the species as critical habitat. For survival and recovery additional unoccupied units were designated. We considered an alternative that did not include these unoccupied units, but because they are necessary for the survival and recovery of these two species, that alternative was not included in this environmental assessment. Upon looking at the threats to *P. submutica*, they were similar across the range of the species and therefore the option of not including less threatened populations was not applicable. We also considered excluding small populations of *P. submutica* but realized that these smaller populations stood the greatest benefit from a critical habitat designation. As such, we did not evaluate that alternative in this environmental assessment.

3.2 Alternative A. No Action Alternative

Pursuant to NEPA and its implementing regulations (40 CFR 1502.14), we are required to consider the No Action Alternative. Alternative A, the No Action Alternative, would maintain the status quo, that is, no critical habitat designation for these species. These protections of listing under the ESA are considered the baseline against which we evaluate the action alternative described below. In the DEA, the costs listed as baseline would be associated with this alternative.

3.3 Alternative B. Designation of Critical Habitat as Identified in the Proposed Rule - (Proposed Action)

Alternative B, our Proposed Action, would designate critical habitat as described in the proposed rule in the Federal Register (July 27, 2011; 76 FR 45078). Approximately 9,641 ac (3,902 ha) across 4 units are being proposed for designation as critical habitat for *Ipomopsis polyantha*, with two occupied and two unoccupied units. Approximately 19,155 ac (7,752 ha) across 4 units are being proposed for designation as critical habitat for *Penstemon debilis*, with two occupied and two unoccupied units. Approximately 25,484 ac (10,313 ha) across 9 units are being proposed for designation as critical habitat for *Phacelia submutica*, all are occupied. In total, approximately 54,280 ac (21,967 ha) are being proposed for designation as critical habitat for the three species. The proposed critical habitat is located in Archuleta, Garfield, and Mesa Counties, Colorado. In the DEA, the costs listed as incremental

Alternative B, the Proposed Action, includes the designation of critical habitat in areas believed to contain the physical and biological features upon which *Ipomopsis polyantha*, *Penstemon debilis*, and *Phacelia submutica* depend. The Service refers to these essential habitat features as

"primary constituent elements." The PCEs for these three species include those habitat components essential for the biological needs of growing, reproducing, dispersing, and exchanging genetic material. Physical and biological features required for *I. polyantha* include: the appropriate plant community, suitable elevations and climate, appropriate soils, adequate habitat for reproduction through pollinators, and the appropriate disturbance regime. Physical and biological features required for *P. debilis* include: the appropriate plant community, suitable elevations and climate, steep slopes, appropriate soils/substrate, adequate habitat for reproduction through pollinators, and the appropriate disturbance regime. Physical and biological features required for *P. submutica* include: the appropriate plant community and barren areas, suitable elevations and climate, suitable surface shapes, appropriate clay soils, areas for reproduction and maintenance of the seed bank, and the appropriate disturbance regime. Please see the proposed critical habitat rule for a further description of how we developed these PCEs (76 FR 45078).

PCEs for *Ipomopsis polyantha* include:

(i) *Mancos shale soils*.

(ii) *Elevation and climate*. Elevations from 6,400 to 8,100 ft (1,950 to 2,475m) and current climatic conditions similar to those that historically occurred around Pagosa Springs, Colorado. Climatic conditions include suitable precipitation; cold, dry springs; and winter snow.

(iii) *Plant Community*.

a. Suitable native plant communities (as described in b. below) with small (less than 100 ft^2 (10 m^2) or larger (several hectares or acres) barren areas with less than 20 percent plant cover in the actual barren areas.

b. Appropriate native plant communities, although these communities may not be like they were historically because they have already been altered. Therefore, the species can be found in areas where only the potential for the appropriate native plant community exists. For example, Ponderosa pine forests may have been cut or areas that had native vegetation may have been scraped. Native habitats and plants are desirable; however, because of the state of the habitat, altered habitats including some nonnative invasive species should not be discounted. These plant communities include:

i. Barren shales,

ii. Open montane grassland (primarily Arizona fescue) understory at the edges of open Ponderosa pine, or

iii. Clearings within the ponderosa pine and Rocky Mountain juniper and Utah juniper and oak communities.

(iv) *Habitat for pollinators.*

a. Pollinator ground and twig nesting areas. Habitats suitable for a wide array of pollinators and their life history and nesting requirements. A mosaic of native plant communities generally would provide for this diversity.

b. Connectivity between areas allowing pollinators to move from one site to the next within each population.

c. Availability of other floral resources; this would include other flowering plant species that provide nectar and pollen for pollinators. Grass species do not provide resources for pollinators.
d. To conserve and accommodate these pollinator requirements, we have identified a 3,280 ft (1,000 m) area beyond occupied habitat to conserve the pollinators essential for reproduction.

(v) *Appropriate disturbance regime*.
a. Appropriate disturbance levels—Light to moderate, or intermittent or discontinuous.
b. Naturally maintained disturbances through soil erosion or human maintained disturbances that can include light grazing, occasional ground clearing, and other disturbances that are not severe or continual.

PCEs for *Penstemon debilis* include:

(i) *Suitable Soils and Geology*.
a. Parachute Member and the Lower part of the Green River Formation, although soils outside these formations would be suitable for pollinators (see *High levels of natural disturbance* below).
b. Appropriate soil morphology characterized by a surface layer of small to moderate shale channers (small flagstones) that shift continually due to the steep slopes and below a weakly developed calcareous, sandy to loamy layer with 40 to 90 percent coarse material.

(ii) *Elevation and climate*. Elevations from 5,250 to 9,600 ft (1,600 to 2,920 m). Climatic conditions similar to those of the Mahogany Bench, including suitable precipitation and temperatures.

(iii) *Plant Community*.
a. Barren areas with less than 10 percent plant cover.
b. Presence of other oil shale endemics, including *Mentzelia rhizomata, Thalictrum heliophilum, Astragalus lutosus, Lesquerella parviflora, Penstemon osterhoutii,* and *Festuca dasyclada*.

(iv) *Habitat for pollinators.*
a. Pollinator ground and twig nesting habitats. Habitats suitable for a wide array of pollinators and their life history and nesting requirements. A mosaic of native plant communities generally would provide for this diversity (see *Plant Community* above). These habitats can include areas outside of the soils identified in *Suitable Soils and Geology*.
b. Connectivity between areas allowing pollinators to move from one population to the next within units.
c. Availability of other floral resources. This would include other flowering plant species that provide nectar and pollen for pollinators. Grass species do not provide resources for pollinators.
d. To conserve and accommodate these pollinator requirements, we have identified a 3,280 ft (1,000 m) area beyond occupied habitat to conserve the pollinators essential for reproduction.

(v) *High levels of natural disturbance*.

a. Very little or no soil formation.
b. Slow to moderate, but constant, downward motion of the oil shale that maintains the habitat in an early successional state.

PCEs for *Phacelia submutica* include:

(i) *Suitable Soils and Geology*.
a. Atwell Gulch and Shire members of the Wasatch formation.
b. Within these larger formations, small areas (from 10 to 1,000 ft^2 (1 to 100 m^2)) on colorful exposures of chocolate to purplish brown, light to dark charcoal gray, and tan clay soils are especially important. These small areas are slightly different in texture and color than the similar surrounding soils. Occupied sites are characterized by alkaline (pH range from 7 to 8.9) soils with higher clay content than similar nearby unoccupied soils.
c. Clay soils that shrink and swell dramatically upon drying and wetting and are likely important in the maintenance of the seed bank.

(ii) *Topography*. Moderately steep slopes, benches, and ridge tops adjacent to valley floors. Occupied slopes range from 2 to 42 degrees with an average of 14 degrees.

(iii) *Elevation and climate*.
a. Elevations from 4,600 to 7,450 ft (1,400 to 2,275 m).
b. Climatic conditions similar to those around DeBeque, Colorado, including suitable precipitation and temperatures. Annual fluctuations in moisture (and probably temperature) greatly influences the number of *Phacelia submutica* individuals that grow in a given year and are thus able to set seed and replenish the seed bank.

(iv) *Plant Community*.
a. Small (from 10 to 1,000 ft^2 (1 to 100 m^2)) barren areas with less than 20 percent plant cover in the actual barren areas.
b. Presence of appropriate associated species that can include (but are not limited to) the natives *Grindelia fastigiata, Eriogonum gordonii, Monolepis nuttalliana,* and *Oenothera caespitosa*. If sites become dominated by *Bromus tectorum* or other invasive nonnative species, they should not be discounted because *Phacelia submutica* may still be found there.
c. Appropriate plant communities within the greater pinyon–juniper woodlands that include:
(i) Clay badlands within the mixed salt desert scrub, or
(ii) Clay badlands within big sagebrush shrublands.

(v) *Maintenance of the Seed Bank and Appropriate Disturbance Levels*.
a. Within suitable soil and geologies (see *Suitable Soils and Geology* above), undisturbed areas where seed banks are left undamaged.
b. Areas with light disturbance when dry and no disturbance when wet. Clay soils are relatively stable when dry but are extremely vulnerable to disturbances when wet.

Again, a complete discussion of the criteria used for defining essential habitat can be found in the July 27, 2011, proposal to designate critical habitat for these three species (76 FR 45078).

3.4 Summary of Actions by Alternative

In Tables 1-3, we provide a comparison between Alternative A, the No Action Alternative, which includes not designating critical habitat for the three plants in Colorado and Alternative B, the Proposed Action, the proposed critical habitat of July 27, 2011.

TABLE 1. Proposed Critical Habitat for *Ipomopsis polyantha*.

Critical Habitat Unit	No Action	Action Alternative (Proposed)
1. Dyke (occupied)	0 ac (0 ha)	1,475 ac (597 ha)
2. O'Neal Hill Special Botanical Area (unoccupied)	0 ac (0 ha)	564 ac (228 ha)
3. Pagosa Springs (occupied)	0 ac (0 ha)	6,456 ac (2,613 ha)
4. Eight Mile Mesa (unoccupied)	0 ac (0 ha)	1,146 ac (464 ha)
Total	0 ac (0 ha)	**9,641 ac (3,902 ha)**

TABLE 2. Proposed Critical Habitat for *Penstemon debilis*.

Critical Habitat Unit	No Action	Action Alternative (Proposed)
1. Brush Mountain (unoccupied)	0 ac (0 ha)	1,437 ac (582 ha)
2. Cow Ridge (unoccupied)	0 ac (0 ha)	4,819 ac (1,950 ha)
3. Mount Callahan (occupied)	0 ac (0 ha)	8,013 ac (3,243 ha)
4. Anvil Points (occupied)	0 ac (0 ha)	4,885 ac (1,977 ha)
Total	0 ac (0 ha)	**19,155 ac (7,752 ha)**

TABLE 3. Proposed Critical Habitat for *Phacelia submutica*.

Critical Habitat Unit	No Action	Action Alternative (Proposed)
1. Sulphur Gulch (occupied)	0 ac (0 ha)	1,046 ac (423 ha)
2. Pyramid Rock (occupied)	0 ac (0 ha)	17,321 ac (7,010 ha)
3. Roan Creek (occupied)	0 ac (0 ha)	54 ac (22 ha)
4. DeBeque (occupied)	0 ac (0 ha)	530 ac (215 ha)
5. Mount Logan (occupied)	0 ac (0 ha)	277 ac (112 ha)
6. Ashmead Draw (occupied)	0 ac (0 ha)	1,276 ac (516 ha)
7. Baugh Reservoir (occupied)	0 ac (0 ha)	430 ac (174 ha)
8. Horsethief Mountain (occupied)	0 ac (0 ha)	4,209 ac (1,703 ha)
9. Anderson Gulch (occupied)	0 ac (0 ha)	341 ac (138 ha)
Total	0 ac (0 ha)	**24,484 ac (10,313 ha)**

4.0 Description of the Affected Environment

The geographic area for Alternative B, the Proposed Action, includes 54,280 ac (21,967 ha) for all three species. The proposed critical habitat is located in Archuleta, Garfield, and Mesa Counties, Colorado on Federal, State, local government, and private lands.

4.1 Physical Environment

Please see "Geographic Range" and "habitat" listed under 2.1 through 2.3 above.

4.2 Fish, Wildlife, and Plants

Table 1 below summarizes the candidate, threatened, and endangered species that may occur in Archuleta, Garfield, and Mesa counties. We have assessed whether these species occur in the 3

plants critical habitat units (Alternative B) in the comment columns. Because Alternative B will generally provide further protection of the habitat at large, this alternative will largely be a benefit to the species where overlap occurs.

In addition, several species considered threatened or endangered by the State of Colorado, the BLM, and the U.S. Forest Service are found within the range of Alternative B and may benefit from the proposed critical habitat designation because of corresponding native habitat protections. Waterfowl, migratory songbirds, furbearers, various big game species, amphibians, and reptiles also use habitat within the Proposed Action area. For these species, there may again be a benefit from the proposed critical habitat designation because of the corresponding native habitat protections. There may be instances where conservation of one resource may conflict with the conservation of the three plants. For example, treatments to encourage big game may threaten a rare plant site.

Table 1. Candidate, threatened, and endangered species in Archuleta, Garfield, and Mesa counties, Colorado.

Common Name	Scientific Name	Taxonomic Group	Status	Counties	Critical Habitat Comments
Humpback chub	*Gila cypha*	Fish	endangered	Garfield, Mesa	Critical habitat for the fish begins downriver near state line, run-off from *Penstemon* and *Phacelia* units feeds into habitat
Bonytail chub	*Gila elegans*	Fish	endangered	Garfield, Mesa	Critical habitat for the fish begins downriver near state line, run-off from *Penstemon* and *Phacelia* units feeds into habitat
Colorado pikeminnow	*Ptychocheilus lucius*	Fish	endangered	Archuleta (depletions), Garfield, Mesa	Critical habitat for the fish along the Colorado River immediately downstream from *Penstemon* and *Phacelia* units; depletions for all units
Razorback sucker	*Xyrauchen texanus*	Fish	endangered	Archuleta (depletions), Garfield, Mesa	Critical habitat for the fish along the Colorado River immediately downstream from *Penstemon* and *Phacelia* units; depletions for all units
Greenback Cutthroat trout	*Oncorhynchus clarki ssp. stomias*	Fish	threatened	Garfield, Mesa (both GB lineage)	Two occupied streams know just up-canyon from *Penstemon* unit 1; runoff from critical habitat units would not affect these streams since the units are down stream
Rio Grande Cutthroat trout	*Oncorhynchus clarki virginalis*	Fish	candidate	Archuleta	Fish not known from the San Juan River basin, no overlap with critical habitat units
Mexican Spotted owl	*Strix occidentalis lucida*	Bird	threatened	Archuleta, Garfield	Forested mountains and canyonlands, no known populations nearby and no nearby critical habitat units for the owl, possibility for both *Ipomopsis* and *Penstemon* units
Southwestern Willow flycatcher	*Empidonax traillii extimus*	Bird	endangered	Archuleta	Los Pinos and Rio Grande proposed as critical habitat for the bird, riparian habitat, may overlap with *Ipomopsis* unit 3

Common Name	Scientific Name	Taxonomic Group	Status	Counties	Critical Habitat Comments
Greater sage-grouse	*Centrocerus urophasianus*	Bird	candidate	Garfield	Current distribution maps do not overlap with critical habitat units; low possibility in sagebrush-steppe habitats
Gunnison sage-grouse	*Centrocerus minimus*	Bird	candidate	Mesa	Only found on Pinyon-Mesa, no overlap with critical habitat units
Yellow-Billed Cuckoo	*Coccyzus americanus*	Bird	candidate	All 3 counties	Needs large blocks of riparian woodlands for breeding; rare in Colorado; may overlap with *Ipomopsis* unit 3
Black-Footed ferret	*Mustela nigripes*	Mammal	endangered	Archuleta	No known sites within critical habitat units; recently introduced population at Vermejo Ranch, NM, no overlap with critical habitat units
Canada Lynx	*Lynx canadensis*	Mammal	threatened	All 3 counties	Boreal forests with deep snow accumulations, lynx may pass through plant critical habitat units only
New Mexico meadow jumping mouse	*Zapus hudsonius luteus*	Mammal	candidate	Archuleta	Wet meadows, no known populations near *Ipomopsis* critical habitat units but a possibility
North American wolverine	*Gulo gulo luscus*	Mammal	candidate	All 3 counties	Extremely rare in Colorado, alpine habitats do not overlap with plant critical habitat units
Colorado hookless cactus	*Sclerocactus glaucus*	Plant	threatened	Garfield, Mesa	Known from *Penstemon* unit 2; and *Phacelia* 1,2,4,5,8 units
Knowlton cactus	*Pediocactus knowltonii*	Plant	endangered	Archuleta	Known only from New Mexico, mapped in very SW Archuleta County, not on Mancos shale, no overlap with critical habitat units

4.3 Human Environment

A wide diversity of human activities and land uses occur throughout or adjacent to the areas identified for designation as critical habitat in Colorado under Alternative B. Uses include 1) energy development, 2) transportation, 3) agriculture and grazing, 4) recreation, and 5) residential and commercial development (and associated actions such as utility infrastructure). Private, State, City, County, and Federal lands are included in the Proposed Action area.

Please see "threats" for each species under 2.1 through 2.3 above.

4.4 Tribal Lands

There are no tribal lands located within the geographic range of these three species. Some potential habitat for *Ipomopsis polyantha* is found on Southern Ute lands, but these lands are not included in the proposed action area.

5.0 Environmental Consequences

This section reviews the expected environmental consequences of designating critical habitat for the three plants under Alternative B, the Proposed Action to designate critical habitat, and the No Action Alternative. Evaluating the impacts of designating critical habitat is done here by comparing no critical habitat versus the proposed critical habitat designation. Measured differences between the existing baseline and the scenario in which critical habitat is designated, as proposed may include, but are not limited to, changes in: land use, environmental quality, property values, or time and effort expended on consultations and other activities by Federal landowners, Federal action agencies, and with a Federal nexus, State and local governments and private third parties. These incremental changes may be either positive or negative.

Regardless of which alternative is chosen, or whether a Federal action affects critical habitat; in accordance with section 7(a)(2) of the ESA, Federal agencies are required to review actions they authorize, fund, or carry out to determine the effects of proposed actions on federally-listed species. If the Federal agency determines that its action may adversely affect a listed species, it must enter into formal consultation with the Service. This consultation results in a biological opinion issued by the Service as to whether the proposed action is likely to jeopardize the continued existence of the species, which is prohibited under the ESA.

A similar process is required when critical habitat is designated. While reviewing their actions to determine the effect on the listed species, Federal agencies also review their action for the effects on critical habitat and enter into section 7 consultations with us on actions they determine may affect critical habitat. If the proposed action is determined to be likely to adversely affect critical habitat, the consultation would result in a biological opinion as to whether the proposed action is likely to destroy or adversely modify designated critical habitat, which also is prohibited under the ESA. Under the Alternative B, critical habitat would be designated; therefore, instances where the Federal action agency would be required to address both the jeopardy standard and the

destruction or adverse modification of critical habitat standard in section 7 consultations would occur.

Activities that would jeopardize the continued existence of a species are defined as those actions that "reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery" of the listed species (50 CFR 402.02). Activities that would destroy or adversely modify critical habitat will most often also result in jeopardy to the species.

It is difficult to differentiate between consultations that result from the listing of these plants (i.e., jeopardy to the species) and consultations that result from the presence of critical habitat (i.e., destruction or adverse modification of critical habitat). The DEA (Industrial Economics 2012) quantifies the potential economic impacts associated with future section 7 consultations in or near proposed critical habitats and is incorporated into this environmental assessment. The following discussion will disclose the potential cost attributable to critical habitat designation, when available, from the DEA.

Individuals, organizations, States, local governments, and other non-Federal entities are only affected by the designation of critical habitat if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding (for example, 404 permits from the U.S. Army Corps of Engineers, dam licensing or relicensing by the FERC, or funding of activities by the Natural Resource Conservation Service).

Potential environmental consequences that may result from implementation of the No Action and Proposed Action are discussed below. All impacts are expected to be indirect, as critical habitat designation does not in itself directly result in any alteration of the environment.

As required by NEPA, this document is in part intended to disclose the programmatic goals and objectives of the ESA. These objectives include protection of natural communities and ecosystems, minimization of fragmentation and promotion of the natural patterns and connectivity of wildlife habitats, promotion of native species and avoidance of the of non-native species introduction, protection of rare and ecologically important species and unique or sensitive environments, maintenance of naturally occurring ecosystem processes and genetic and structural diversity, and restoration of ecosystems, communities and recovery of species.

5.1 Physical Environment

None of the alternatives will directly impact the physical environment since this an administrative action only.

5.2 Fish, Wildlife, and Plants

5.2.1 *Ipomopsis polyantha, Penstemon debilis,* and *Phacelia submutica*

Alternative A, the No Action Alternative, would have no impacts on the three plants because the protections resulting from its listing in 2011, and the associated requirements of section 7 of the ESA are already in place.

Alternative B, the Proposed Action, would have similar effects to the three plants as the No Action Alternative in that there may be minimal additional impacts resulting from critical habitat designation beyond those already considered in section 7 consultation since the 2011 listing. However, these additional impacts would be more widespread under Alternative B, as it would designate critical habitat. Benefits to the three plants that may accrue from the designation of critical habitat, under Alternative B, would relate to the requirement under section 7 of the ESA that Federal agencies review their actions to assess their effects on critical habitat. Designation of critical habitat may also provide some benefits to the three plants by alerting Federal agencies to situations when section 7 consultation is required. Another potential benefit is that critical habitat designation may help to focus Federal, State, and private conservation and management efforts by identifying the areas of most importance to a species. Critical habitat also allows for long-term project planning for species conservation.

Designating critical habitat does not, by itself, lead to the recovery of a listed species. The designation does not establish a reserve, create a management plan, establish numerical population goals, prescribe specific management practices (inside or outside of critical habitat), or directly affect areas not designated as critical habitat. Specific management recommendations for areas designated as critical habitat are most appropriately addressed in recovery and management plans, and through section 7 consultation and section 10 permits.

Potential benefits to the species include educational benefits (increasing the knowledge that a species exists or is in an area), improvements to air or water quality as a result of species' protections, and conservation of native habitats. Some of these benefits can be attributed to the listing of the three plants and some would be attributable to the critical habitat designation. The DEA does not attempt to quantify the economic benefits associated with the proposed critical habitat designation but does recognize there is an economic value for these services (Industrial Economics 2012). These benefits are especially true for those unoccupied areas where protections for the species, through occupied habitat protections, would not apply.

5.2.2 Other Fish, Wildlife and Plant Species

Alternative A, the No Action Alternative, would have no significant impacts on fish, wildlife, or plants beyond those protections already in place as a result of listing of the three plants in 2011, and associated requirements of section 7 of the ESA.

Alternative B, the Proposed Action, would have similar effects on fish, wildlife, and plants, in that there may be minimal additional impacts associated with designation of critical habitat beyond those already considered in section 7 consultation since the 2011 listing. However, these additional impacts would be more widespread under Alternative B, as it would designate critical habitat. The objectives of designating critical habitat include the protection of natural

communities and ecosystems, minimization of fragmentation and maintenance and restoration of the natural landscape patterns and connectivity of wildlife habitats, promotion of native species and avoidance of non-native species introduction, protection of rare and ecologically important species and unique or sensitive environments, maintenance of naturally occurring ecosystem processes and genetic and structural diversity, and restoration of ecosystems, communities and recovery of species.

Maintenance or restoration of natural landscape patterns is of particular importance in those areas where proposed critical habitat may overlay *Sclerocactus glaucus* occurrences. Management of a critical habitat unit solely for one of the three plants will not deleteriously effect *S. glaucus*, and could lead to a net benefit to the species because of the preservation of intact habitat.

Fish, wildlife, and plants may indirectly benefit as a result of ecosystem protections provided through conservation of the three plants and the associated requirements of section 7(a)(2) of the ESA. As a result of critical habitat designation, Federal agencies may be able to prioritize landowner incentive programs such as the Wildlife Habitat Incentives Program or Environmental Quality Incentives Program enrollment, riparian easements, and private landowner agreements that benefit the plants, as well as other fish, wildlife, and plant species. Critical habitat designation also may assist States in prioritizing their conservation and land-management programs.

5.3 Human Environment

As discussed above, individuals, organizations, States, local governments, and other non-Federal entities are only affected by the designation of critical habitat if their actions occur on Federal lands, require a Federal permit, license, or authorization, or involve Federal funding. There are no State or local laws in Colorado that apply to critical habitat for plants. Since July 2011, Federal agencies have been required to consider the effects of their actions to the three plants and consult with the Service as appropriate. A similar process is required for critical habitat and we do not expect the critical habitat designation to cause large increases in the number or complexity of consultations. However, we realize that some Federal agencies have not fully recognized their responsibilities under the ESA and may not have been initiating section 7 consultation in all cases where consultation is appropriate. Those agencies may recognize their need to do so in areas designated as critical habitat, resulting in a small increase in consultations.

A perception may exist within some segments of the public that any designation of critical habitat will severely limit property rights; however, critical habitat designation has no effect on private actions on private land that do not involve Federal approval or action. We recognize that there are private actions on private lands that involve Federal actions; however, there should already be section 7 consultations taking place in these situations.

Differentiating between consultations that result from the listing of the three plants and consultations that result from the presence of critical habitat is difficult. However, the following discussion will address how much of the cost associated with all future section 7 consultation in

or near all proposed critical habitat units is likely attributable to critical habitat designation, as provided in the DEA (Industrial Economics 2012). The DEA discusses the costs associated with all proposed critical habitat, we have included these costs here in Table 2.

Table 2. Incremental costs associated with the designation of critical habitat for *Ipomopsis polyantha*, *Penstemon debilis*, and *Phacelia submutica*.

UNIT NUMBER	UNIT NAME	OIL & GAS - LOW	OIL & GAS - HIGH	TRANSPORTATION	AGRICULTURE & GRAZING	RECREATION	SPECIES MANAGEMENT	SUBTOTAL - LOW	SUBTOTAL - HIGH
AREAS PROPOSED FOR DESIGNATION									
PAGOSA SKYROCKET									
1	Dyke	$0	$0	$9,370	$0	$0	$0	**$9,370**	**$9,370**
2	O'Neal Hill Special Botanical Area	$0	$0	$0	$0	$7,500	$0	**$7,500**	**$7,500**
3	Pagosa Springs	$0	$0	$3,330	$0	$0	$0	**$3,330**	**$3,330**
4	Eight Mile Mesa	$0	$0	$0	$0	$7,500	$0	**$7,500**	**$7,500**
Subtotal		**$0**	**$0**	**$12,700**	**$0**	**$15,000**	**$0**	**$27,700**	**$27,700**
PARACHUTE BEARDTONGUE									
1	Brush Mountain	$11,600	$195,000	$0	$0	$0	$0	**$11,600**	**$195,000**
2	Cow Ridge	$35,500	$599,000	$0	$0	$0	$0	**$35,500**	**$599,000**
3	Mount Callahan	$10,900	$184,000	$0	$0	$2,130	$0	**$13,000**	**$186,000**
4	Anvil Points	$8,470	$143,000	$0	$0	$2,130	$0	**$10,600**	**$145,000**
Subtotal		**$66,400**	**$1,120,000**	**$0**	**$0**	**$4,250**	**$0**	**$70,600**	**$1,120,000**
DEBEQUE PHACELIA									
1	Sulphur Gulch	$37,300	$629,000	$0	$1,590	$1,060	$0	**$39,900**	**$632,000**
2	Pyramid Rock	$627,000	$10,600,000	$0	$1,590	$1,060	$0	**$630,000**	**$10,600,000**
3	Roan Creek	$398	$6,720	$0	$0	$0	$0	**$398**	**$6,720**
4	DeBeque	$13,100	$221,000	$0	$1,590	$1,060	$0	**$15,800**	**$224,000**
5	Mount Logan	$0	$0	$0	$1,590	$2,130	$0	**$3,720**	**$3,720**
6	Ashmead Draw	$44,700	$755,000	$0	$1,590	$1,060	$0	**$47,400**	**$757,000**
7	Baugh Reservoir	$18,200	$307,000	$0	$1,590	$1,060	$0	**$20,800**	**$310,000**
8	Horsethief Mountain	$60,200	$1,020,000	$0	$43,600	$5,820	$0	**$110,000**	**$1,070,000**
9	Anderson Gulch	$1,150	$19,500	$0	$0	$0	$0	**$1,150**	**$19,500**
Subtotal		**$802,000**	**$13,500,000**	**$0**	**$53,200**	**$13,300**	**$0**	**$868,000**	**$13,600,000**
Total		**$868,000**	**$14,700,000**	**$12,700**	**$53,200**	**$32,500**	**$0**	**$967,000**	**$14,800,000**
AREAS CONSIDERED FOR EXCLUSION									
PARACHUTE BEARDTONGUE									
3	Mount Callahan – Natural Areas	$0		$0	$0	$0	$0		$0

5.3.1 Energy Development

Alternative A, the No Action Alternative, would have no impacts on energy development activities, including natural gas extraction, beyond those already resulting from the 2011 listing of the three plants.

For Alternative B, the Proposed Action, there is the potential for a significant number of energy development activities within critical habitat over the next 20 years. Energy development includes; oil and gas extraction, transmission line construction and maintenance, mine reclamation, and associated infrastructure. Energy development activities are a threat to *Penstemon debilis* and *Phacelia submutica*. The soil conditions needed by the species are easily disturbed, as the soil surface structure is fragile. Blading of the top few inches of soil during well pad and road construction, pipeline installation, and construction of associated facilities changes the soil structure, thereby threatening the species. In addition, the operation of wells could potentially impact the species through dust generation, loss of pollinator habitat, spills of produced water or other drilling wastes, and unintentional trampling by employees and contractors. Road traffic on unpaved access roads during both construction and operation of wells and facilities increases dust emissions, which can affect plant photosynthesis, affect gas and water exchange, clog plant pores, and increase leaf temperature, leading to decreased plant vigor and growth. Oil shale development has not been assessed in the DEA because this development is not expected to occur in the proposed critical habitat in the next 20 years.

The majority of the protections and project modifications for the plants would be addressed through the section 7 process. This is not true when projects occur within unoccupied critical habitat units or in areas further than 1000 m (3,280 ft) from *Ipomopsis polyantha* or *Penstemon debilis*, and in areas further than 100 m (328 ft) from *Phacelia submutica* on Federal lands or with a Federal nexus. This is discussed in further detail in the DEA (Industrial Economics 2012). The total costs from the proposed designation of critical habitat associated with these activities is predicted to range from $868,000 to $14.7 million dollars over the next 20 years (Industrial Economics 2012). The majority of these costs (between 90 and 99 percent) are attributed to oil and gas development (Industrial Economics 2012).

5.3.2 Transportation Projects

Action A, the No Action Alternative would have no impacts on transportation projects beyond those already resulting from the 2011 listing of the three plants and the associated requirements of section 7 of the ESA.

For Alternative B, the Proposed Action, there is the potential for a significant number of transportation projects within the proposed critical habitat over the next 20 years. All three plant species are threatened by transportation projects. Due to its distribution within highway right-of-ways (ROWs), *Ipomopsis polyantha* is threatened by transportation projects such as construction of new access roads or acceleration lanes and bike path installation or maintenance. Additionally,

CDOT plants exotic grasses along roadsides that prevent *I. polyantha* plants from growing. Vehicles and their drivers can crush plants and disturb the shale slopes where the plants grow. In addition, road maintenance prevents reclamation of the habitat. Transportation projects may include: (1) construction and maintenance of roads, utilities, and other infrastructure, (2) potential expansion or improvement of the existing public road network, and (3) the construction or improvement of private roads. CDOT activities generally receive Federal funding and so require section 7 consultation.

Impacts to transportation projects resulting from the proposed critical habitat designation are for the costs of project modifications to protect habitat. The total costs from the proposed designation of critical habitat associated these activities is predicted be $12,700 over the next 20 years (Industrial Economics 2012).

5.3.3 Agriculture and Grazing

Action A, the No Action Alternative would have no impacts on agricultural and grazing practices, beyond those already resulting from the 2011 listing of the three plants and the associated requirements of section 7 of the ESA.

For Alternative B, the Proposed Action, agricultural activities will be affected by critical habitat only minimally, because they typically do not involve a Federal nexus, as most are not authorized, permitted, or funded by a Federal agency. Some Federal agricultural programs may create a Federal nexus in critical habitat areas (those funded through the Farm Service Agency and the Natural Resources Conservation Service). Grazing occurs on Federal lands primarily in *Phacelia submutica* habitat and is generally permitted by the BLM across the species' range. We expect this grazing is negatively impacting *P. submutica*. Pagosa skyrocket does not tolerate intensive livestock grazing. Destruction of flowering Pagosa skyrocket plants, rosettes and seeds due to heavy livestock use is a significant threat; all of this grazing occurs on private lands.

Impacts to agriculture and grazing activities from the proposed critical habitat are related to cost of fencing out grazing on U.S. Forest Service lands and administrative costs associated with evaluating effects in critical habitat. The total costs from the proposed designation of critical habitat associated these activities is predicted be $53,200 over the next 20 years.

5.3.4 Recreation

Action A, the No Action Alternative would have no impacts on recreation, beyond those already resulting from the 2011 listing of the three plants and the associated requirements of section 7 of the ESA.

For Alternative B, the Proposed Action, recreation activities will be affected only minimally by the proposed critical habitat designation through costs related to travel management planning, and consultation costs related to fencing activities. Light recreation, including hunting, road-running, horseback riding, dispersed camping, and firewood gathering, occurs in *Ipomopsis polyantha* habitat. ORV recreation occurs in *Phacelia submutica* habitat. Roads constructed for

use in energy development allow increased ORV access to the slopes that support the plant habitat on BLM land. ORV tires can change the soil structure needed by the species through surface disturbance and can have a negative effect on seed banks, where seeds can remain dormant up to five years.

Impacts to recreation activities from the proposed critical habitat are related to administrative costs associated with travel management planning and consultation related to the management of recreation activities. The total costs from the proposed designation of critical habitat associated these activities is predicted be $32,500 over the next 20 years.

5.3.5 Residential and Commercial Development

Action A, the No Action Alternative would have no impacts on residential and commercial development, beyond those already resulting from the 2011 listing of the three plants and the associated requirements of section 7 of the ESA.

For Alternative B, the Proposed Action, impacts to residential and commercial development projects are not considered significant because most of this development occurs on private lands where the plants are not protected by the ESA. However, residential and commercial development represents a significant threat to the *Ipomopsis polyantha* and *Phacelia submutica*. Because of a lack of protections, no costs have been associated with these activities.

5.4 Technical Assistance Requests of the Service

Alternative A, the No Action Alternative, would have no impacts on technical assistance requests to the Service beyond those already resulting from the 2011 listing of the three plants, and the associated requirements of section 7 of the ESA.

For Alternative B, the proposed action, technical assistance costs associated with projects affecting proposed critical habitat for the three plants would seldom exceed those already resulting from the 2011 listing, since plants are present in many of the proposed critical habitat units. In unoccupied units, all technical assistance requests would be due to the designation of critical habitat. Requests for technical assistance may be associated with projects in critical habitat, in occupied habitat, or elsewhere. The requests may come from private parties attempting to clarify whether they have an issue under the ESA. However, many technical assistance requests will continue to be a result of the presence of a listed species, not critical habitat. Therefore, only a portion of the technical assistance costs is attributable to critical habitat. Technical assistance requests may increase slightly as a result of publicity regarding the designation of critical habitat. Any resulting increase in costs would be borne by the Service.

5.5 Archeological and Cultural Resources

Alternative A, the No Action Alternative, would have no impacts on archaeological and cultural areas beyond those already resulting from the 2011 listing of 3 plants, and the associated requirements of section 7 of the ESA.

Alternative B, the Proposed Action, would have similar effects on archeological and cultural sites. Designation of the proposed critical habitat is expected to have no direct impacts on these resources. As a result of designation, increased protection of some sites and resources within critical habitat may occur if a Federal action is proposed.

5.6 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629 (1994), directs Federal agencies to incorporate environmental justice in their decision making process. Federal agencies are directed to identify and address as appropriate, any disproportionately high and adverse environmental effects of their programs, policies, and activities on minority or low-income populations. There are no identified adverse or beneficial effects unique to minority or low-income populations in areas alternative A or alternative B.

5.7 Cumulative Impacts

Designation of critical habitat for the three plants will add minimal incremental impacts when added to other past, present, and reasonably foreseeable future actions.

We expect the impacts to be relatively small because of the protections already in place through the listing of these three plants. In addition to the three plants, several listed species occur in the general vicinity of the proposed critical habitat (see Table 1). We expect many of these species will benefit from this proposed critical habitat designation by increased protection of their native habitat. Therefore, the impacts to these other species and their critical habitat are not additive.

As discussed previously, Federal agencies are required to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of the listed species, or destroy or adversely modify designated critical habitat in accordance with section 7(a)(2) of the ESA.
For activities that may result in “destruction or adverse modification” of critical habitat, we currently assess these effects based under guidance provided in 2004 (Service 2004). This guidance has us assess cumulative effects based on effects of future, non-Federal actions that are reasonably certain to occur in terms of the primary constituent elements or habitat qualities essential to the conservation of the species (Service 2004). Activities that jeopardize a species are defined as those actions that “reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery” of the listed species (50 CFR 402.02). According to these definitions, activities that destroy or adversely modify critical habitat would generally jeopardize the species. Therefore, designation of critical habitat has rarely resulted in greater protection than that afforded under section 7 by the listing of a species, except in the unoccupied critical habitat units. Section 7 consultations apply only to actions with Federal involvement (i.e., activities authorized, funded, or conducted by Federal agencies), and do not impact activities strictly under State or private authority. In practice, the designation of critical habitat for the three plants will likely provide little additional benefits to the species in

presently occupied areas because there are functioning program activities already alerting Federal agencies and the public of endangered species concerns.

Section 4(b)(2) of the ESA requires us to designate critical habitat on the basis of the best scientific and commercial information available and to consider the economic and other relevant impacts of designating a particular area as critical habitat. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as part of critical habitat. We cannot exclude such areas from critical habitat if such exclusion would result in the extinction of the species concerned. We are currently conducting an analysis of the economic and other relevant impacts of Alternative B, the Proposed Action. The DEA is available for public review and comment, and we have announced its availability in the Federal Register. We will consider the results of that analysis, and modifications based on public comments received, in preparing the final Environmental Assessment of proposed critical habitat designation.

We have included a summary of economic impacts from the DEA in the box below. Economic benefits are not quantified in the DEA and so are not included in the key findings below.

KEY FINDINGS

- Over the next 20 years, potential baseline impacts in areas proposed for designation are estimated to be $3.85 million to $9.81 million, assuming a seven percent discount rate. Baseline impacts in areas considered for exclusion are estimated to be $2.36 million.
- Over the next 20 years, potential incremental impacts of designating critical habitat in the areas proposed for designation are estimated to be $967,000 to $14.8 million, assuming a seven percent discount rate. Incremental costs associated with the designation of critical habitat for each of the plants are:
    - $27,700 for Pagosa skyrocket;
    - $70,600 to $1.12 million for Parachute beardtongue; and
    - $868,000 to $13.6 million for DeBeque phacelia.
- Impacts to oil and gas development represent 90 to 99 percent of the incremental costs associated with the proposed designation of critical habitat. Impacts to agriculture and grazing, recreation, and transportation projects combined represent less than ten percent of the incremental impacts in both scenarios analyzed.
- The range in potential future impacts reflects significant uncertainty about the level and distribution of future oil and gas development, characteristics of future conservation recommendations, and costs associated with these recommendations. In particular, the costs applied in this analysis are specific to Parachute beardtongue; costs associated with DeBeque phacelia may be lower given the gentler terrain surrounding the plant.

Table 3. Summary of Environmental Consequences by Alternative (Costs Attributable to Proposed Critical Habitat (Industrial Economics 2012)).

Impacts	Alternative A: No Action	Alternative B: Proposed Action
Ipomopsis polyantha	No change to existing situation.	May be beneficial impacts beyond those associated with the 2011 listing, especially in currently unoccupied units. Expansion of critical habitat, adverse modification standard. Designation of critical habitat can help focus conservation activities for listed species.
Penstemon debilis	No change to existing situation.	May be beneficial impacts beyond those associated with the 2011 listing, especially in currently unoccupied units. Expansion of critical habitat, adverse modification standard. Designation of critical habitat can help focus conservation activities for listed species.
Phacelia submutica	No change to existing situation.	May be beneficial impacts beyond those associated with the 2011 listing. Expansion of critical habitat, adverse modification standard. Designation of critical habitat can help focus conservation activities for listed species.
Other Fish, Wildlife, and Plants	No change to existing situation.	May be beneficial impacts beyond those associated with the 2011 listing. Designation of critical habitat can help focus conservation activities for those species within the critical habitat units.
Energy Development	No change to existing situation.	Baseline costs associated with the conservation of the species and consultation between $375,000 and $6.3 million dollars. Incremental costs associated with the proposed critical habitat designation between $868,000 and $14.7 million dollars.
Transportation Projects	No change to existing situation.	Baseline costs associated with the conservation of the species and consultation $3.4 million dollars. Incremental costs associated with the proposed critical habitat designation $12,700 dollars.
Agriculture and Grazing	No change to existing situation.	Baseline costs associated with the conservation of the species and consultation $33,500. Incremental costs associated with the proposed critical habitat designation $53,200 dollars.
Recreation	No change to existing situation.	Baseline costs associated with the conservation of the species and consultation $64,500 dollars. Incremental costs associated with the proposed critical habitat designation $32,500 dollars.
Residential and Commercial Development	No change to existing situation.	No baseline or incremental costs because development would occur on private lands with no ESA protections.
Technical Assistance Request of the Service	No change to existing situation.	No appreciable additional impacts beyond those associated with the 2011 listing.
Archaeological and Cultural	No change to existing situation.	No additional impacts.
Environmental Justice	No change to existing situation.	No impacts.

6.0 Council on Environmental Quality Analysis of Significance

Under CEQ 40 CFR Part 1508.27, the determination of "significantly" requires consideration of both context and intensity.

6.1 Context

Impacts of the action, although long-term, will not be national, only regional and mostly local in context; and any that occur are expected to be small.

6.2 Intensity

Intensity is defined by CEQ as referring to the severity of impact. The following 10 points identified by CEQ were considered in evaluating intensity:

1. We foresee minimal additional negative impacts beyond what we already consider through section 7 consultation since the 2011 listing. There may be perceived negative impacts but we are carrying out a public outreach program, which should address and minimize most of those misconceptions. There may be some beneficial impacts to the environment.

2. This designation will not have a discernible impact on human safety.

3. Although several areas designated as critical habitat are in proximity to historic and cultural sites, parklands, farmland, wetlands, scenic rivers and ecologically critical areas, it is unlikely that adverse impacts will occur to these areas.

4. There is a perception by some segments of the public that critical habitat designation will severely limit property rights; however, critical habitat designation has no effect on private actions on private land that do not involve Federal approval or action.

5. The Service has designated critical habitat for other species in the recent past and we are familiar with the associated effects. Therefore, we anticipate minimal effects to the human environment and we are certain this action does not involve any unique or unknown risks.

6. This designation of critical habitat is not expected to set any precedents for future actions with significant effects or represent a decision in principle about a future consideration because critical habitat has been designated before for other species, as required by law.

7. This designation of critical habitat will be additive (cumulative) to critical habitat that has been, and will be, designated for other species. However, it is the Service's conclusion that the adverse impacts of any and all critical habitat designations are small, and, therefore, insignificant due to the existing impacts, both beneficial and adverse, already resulting from the listing of the species involved.

8. This designation will have minimal adverse effects to National Register of Historic Places or other cultural sites.

9. Most impacts from this designation of critical habitat will be beneficial to endangered and threatened species, particularly the three plants. Designation of critical habitat can help focus conservation activities for listed species by identifying areas essential to conserve the species. Designation of critical habitat also alerts the public, as well as land-managing agencies, to the importance of these areas. These benefits are minimal, as most occurred at the time of listing.

10. This designation of critical habitat will not violate any Federal, State, or local laws or requirements imposed for the protection of the environment.

7.0 Contacts and Coordination With Others

This proposed designation of critical habitat has and will be coordinated with the State of Colorado, Federal agencies, and other interested parties through letters, faxes, emails, telephone calls, and our web site. U.S. Forest Service contacts include the San Juan National Forest; the White River National Forest, the Grand Mesa and Gunnison National Forest, and the U.S. Forest Service's Rocky Mountain Region. U.S. Bureau of Land Management contacts include the Colorado State Office, the Colorado River Valley Field Office, The Grand Junction Field Office, and the Tres Rios Field Office. Additional contacts include the Colorado Natural Areas Program, the Colorado Natural Heritage Program, the Colorado Department of Transportation, counties (Archuleta, Garfield, and Mesa), the Town of Pagosa Springs, and Oxy USA. Colorado State elected representatives include the Governor (John Hickenlooper), Senators (Mark Udall and Michael Bennet), and Scott Tipton of the 3rd Congressional District. Petitioners include the Center for Native Ecosystems (now Rocky Mountain Wild), Colorado Native Plant Society, Center for Biological Diversity, Biodiversity Conservation Alliance.

7.1 List of Agencies, Organizations, and Persons to Whom Copies of This Environmental Assessment Were Sent or Contacted

The following is a list of individuals, organizations, and public agencies contacted concerning development of this Environmental Assessment and the proposed rule to designate critical habitat for the three plants. Each of these also will be notified of the publication of the final rule:

FEDERAL AGENCIES

DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service, Colorado
U.S. Forest Service, Region 2 (Rocky Mountain Region), Lakewood, Colorado
San Juan National Forest
White River National Forest
Grand Mesa and Gunnison National Forest

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE INTERIOR
- Bureau of Land Management
  - Colorado Field Office
  - Colorado River Valley Field Office
  - Grand Junction Field Office
  - Tres Rios Field Office
- U.S. Fish and Wildlife Service
  - Private Lands Coordinator
  - Law Enforcement Division
- DEPARTMENT OF TRANSPORTATION
  - Federal Highway Administration

FEDERAL CONGRESSIONAL DELEGATION
- COLORADO
  - Office of Senator Udall
  - Office of Senator Bennet
  - Office of Representative Scott Tipton

STATE AGENCIES

- Colorado Natural Areas Program
- Colorado Department of Natural Resources
- Colorado Department of Transportation
- Colorado Division of Wildlife

GOVERNORS
- Colorado, John Hickenlooper

COLORADO COUNTY COMMISSIONERS
County Commissioners from the following counties: Archuleta, Garfield, and Mesa

LOCAL GOVERNMENTS AND PRIVATE GROUPS

- Rocky Mountain Wild
- Colorado Native Plant Society,
- Center for Biological Diversity,
- Biodiversity Conservation Alliance
- Colorado Natural Heritage Program
- Oxy USA
- Western Energy Alliance

8.0 List of Contributors

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10.0 Appendices

10.1 Maps of Proposed Action – units and maps correspond to proposed critical habitat units as depicted in the Federal Register.

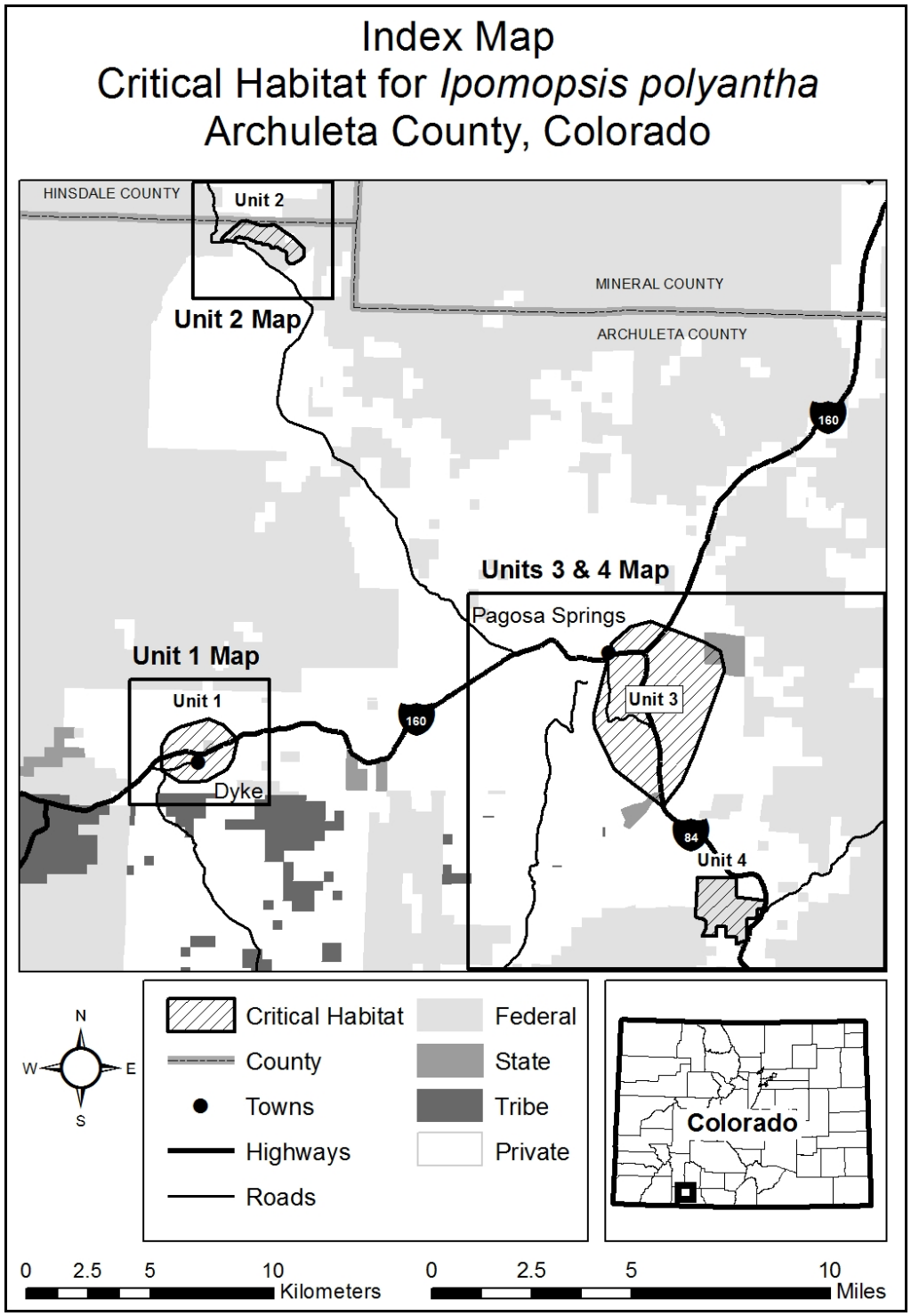

Figure 1. Proposed critical habitat for *Ipomopsis polyantha*.

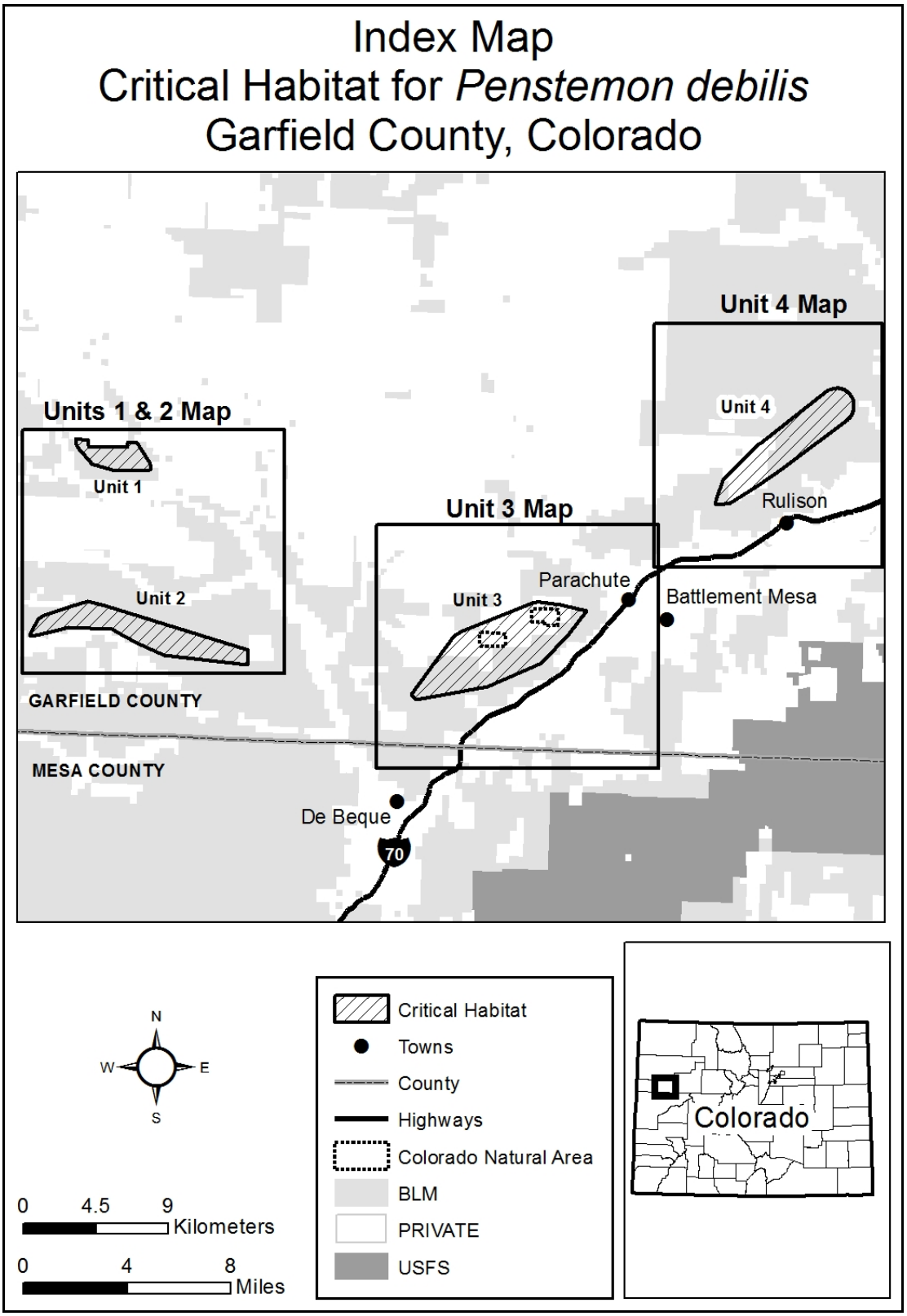

Figure 2. Proposed critical habitat for *Penstemon debilis.*

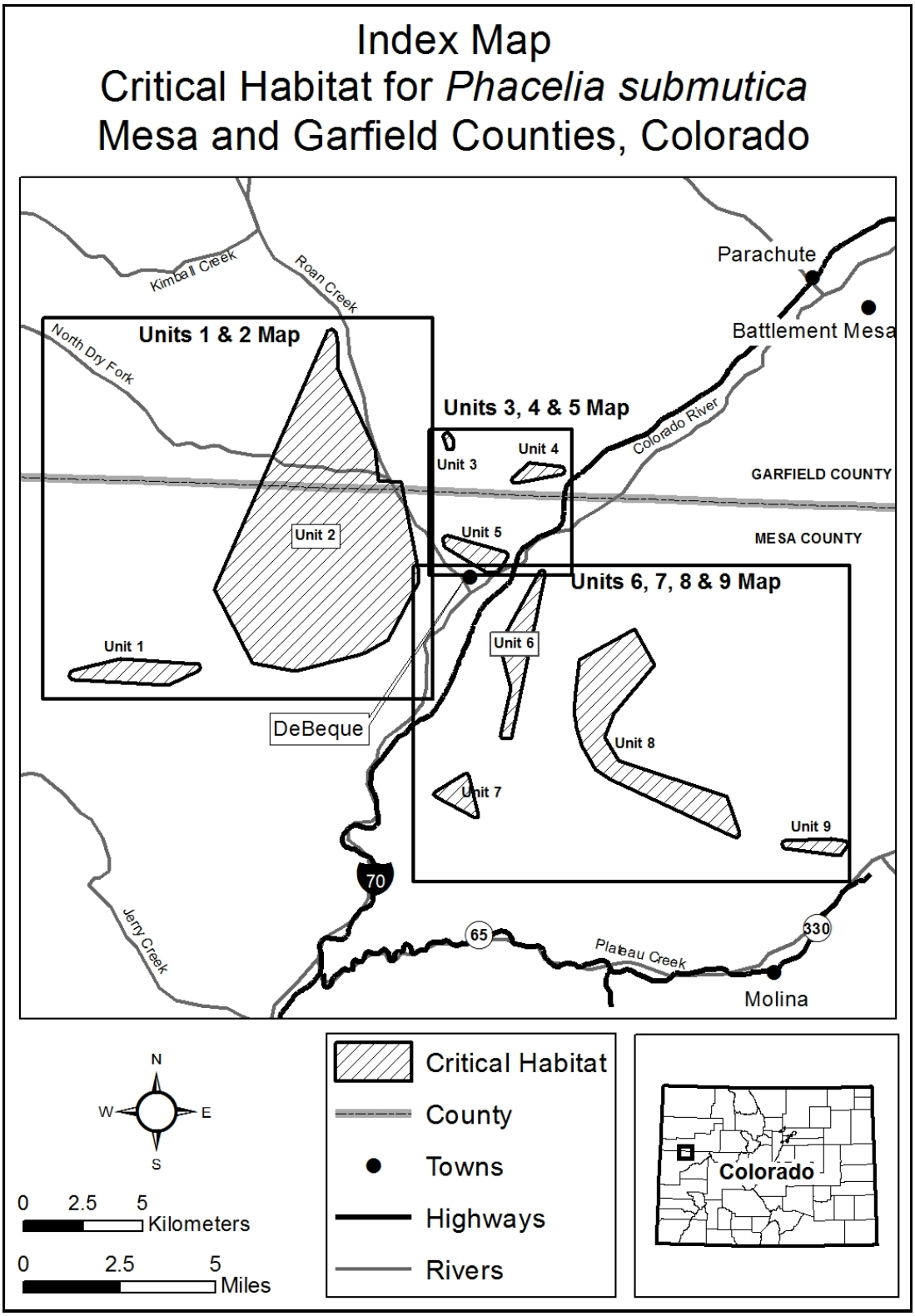

Figure 3. Proposed critical habitat for *Phacelia submutica*.

10.2 Maps of Alternative A

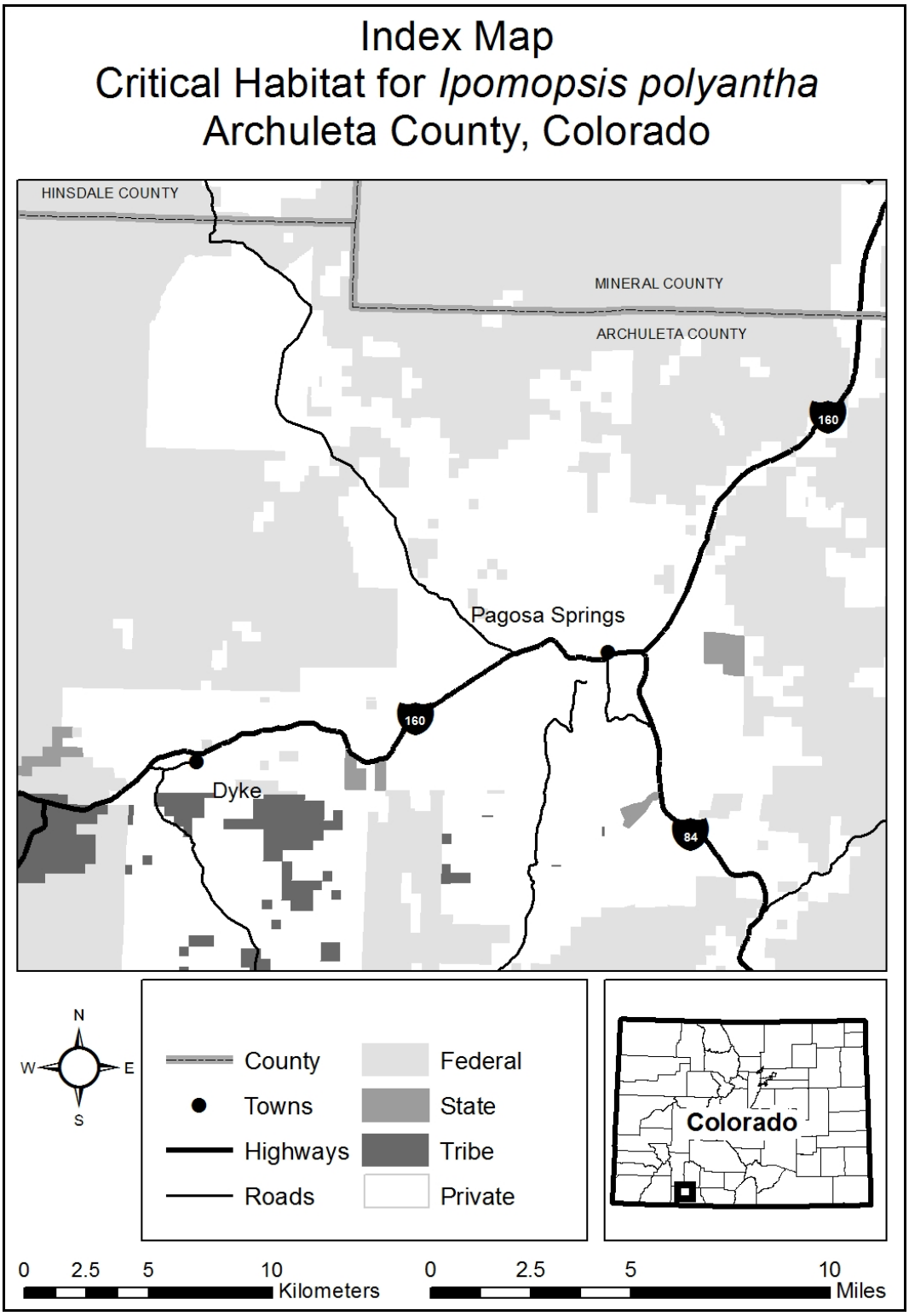

Figure 4. *Ipomopsis polyantha* areas without a proposed critical habitat designation.

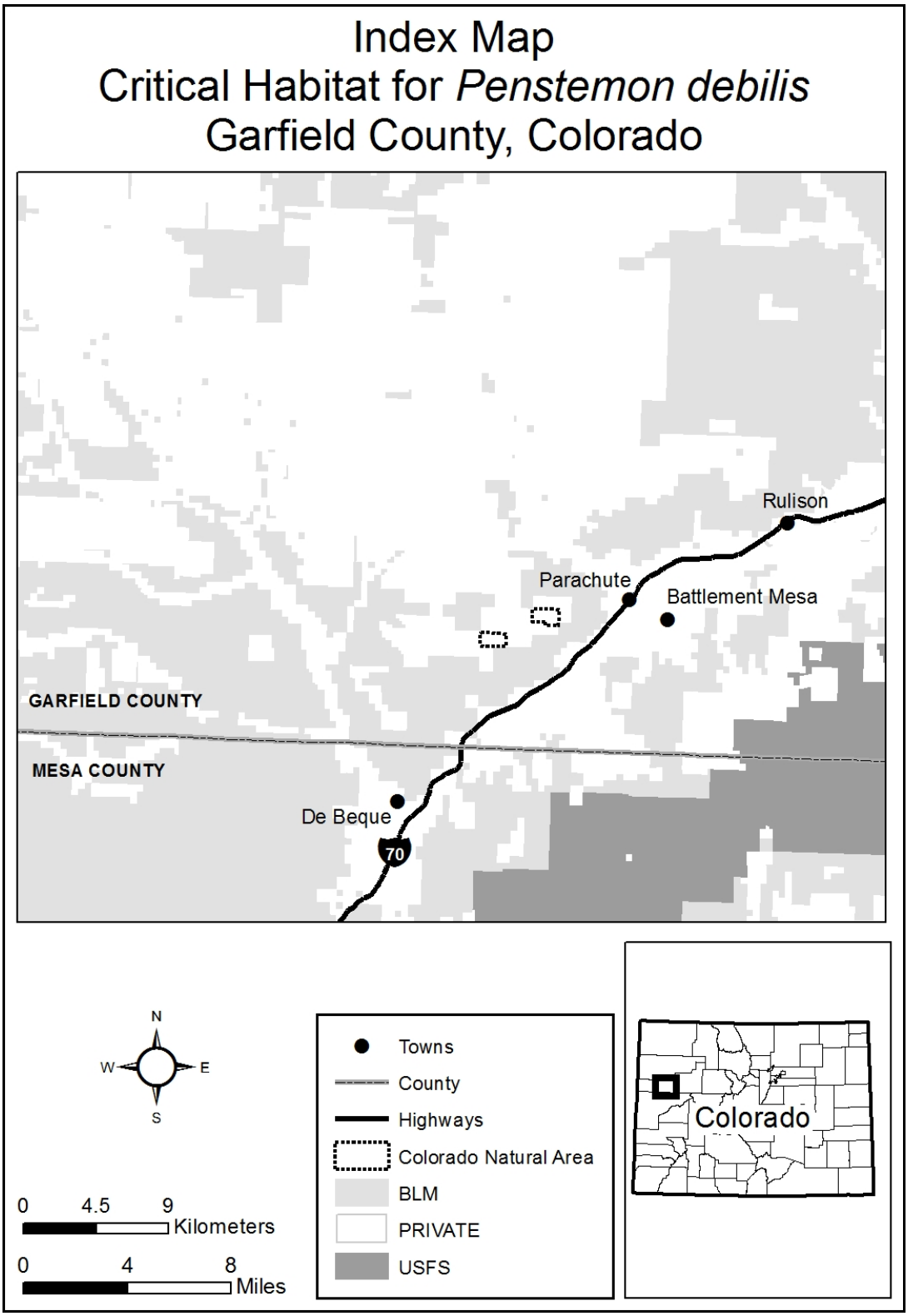

Figure 5. ***Penstemon debilis*** **areas without a proposed critical habitat designation.**

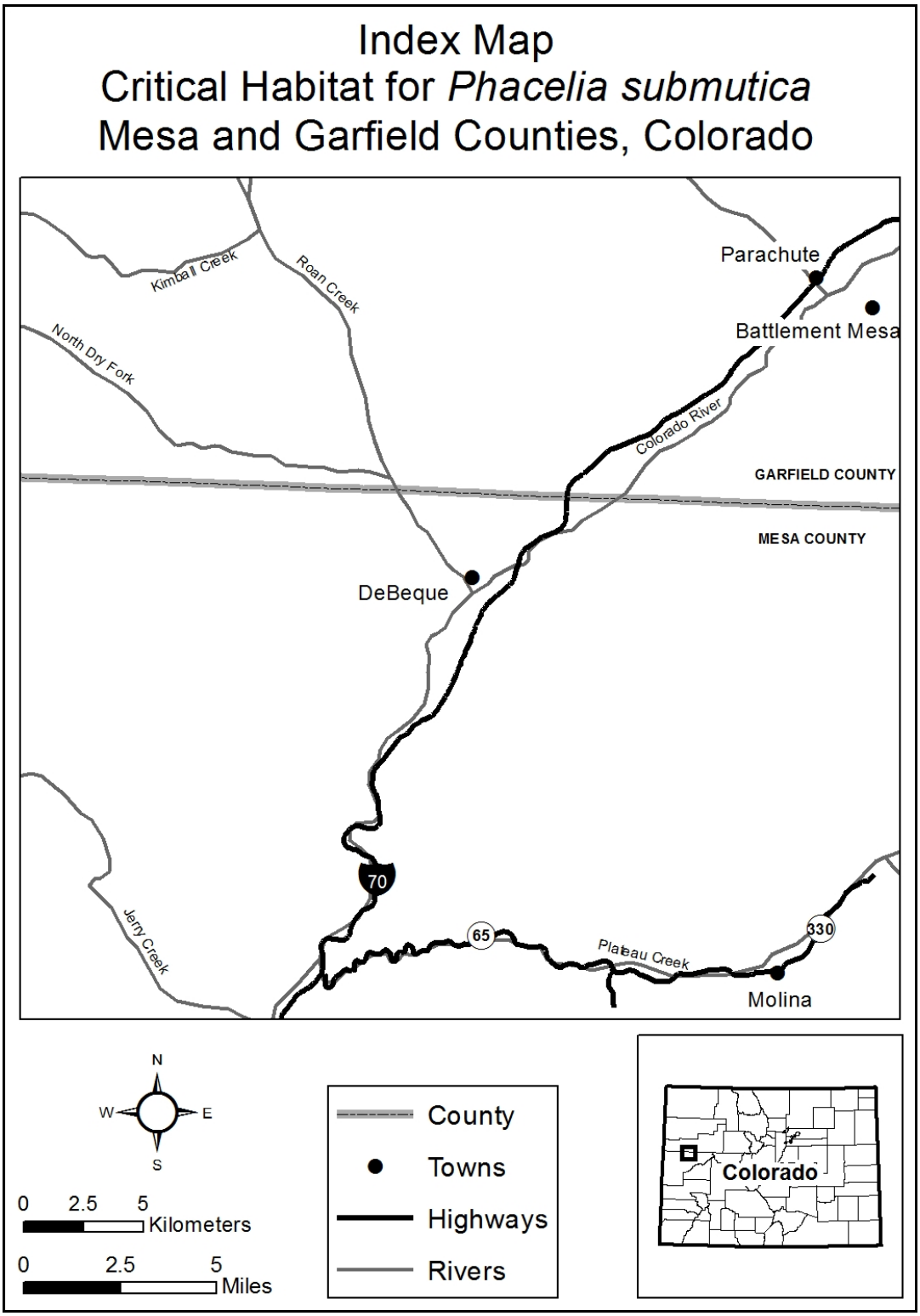

Figure 6. *Phacelia submutica* areas without a proposed critical habitat designation.