DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Docket No. [FWS–R6–ES–2010–0087; MO 92210–0–008]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List Astragalus hamiltonii, Penstemon flowersii, Eriogonum soredium, Lepidium ostleri, and Trifolium friscanum as Endangered or Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list *Astragalus hamiltonii* (Hamilton milkvetch), *Penstemon flowersii* (Flowers penstemon), *Eriogonum soredium* (Frisco buckwheat), *Lepidium ostleri* (Ostler's peppergrass), and *Trifolium friscanum* (Frisco clover) as threatened or endangered under the Endangered Species Act of 1973 (ESA), as amended. After review of all available scientific and commercial information, we find that listing *A. hamiltonii* and *P. flowersii* is not warranted at this time. However, we ask the public to submit to us new information that becomes available concerning the threats to *A. hamiltonii* and *P. flowersii* or their habitat at any time. We find that listing *E. soredium, L. ostleri,* and *T. friscanum* as threatened or endangered is warranted. However, currently *listing E. soredium, L. ostleri,* and *T. friscanum* is precluded by higher priority actions to amend the Federal Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, we will add *E. soredium, L. ostleri,* and *T. friscanum* to our candidate species list. We will develop proposed rules to list *E. soredium, L. ostleri,* and *T. friscanum* as our priorities allow. We will make determinations on critical habitat during development of the proposed listing rules. In the interim period, we will address the status of the candidate taxa through our annual Candidate Notice of Review.

DATES: The finding announced in this document was made on February 23, 2011.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R6–ES–2010–0087. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Utah Ecological Services Field Office, 2369 West Orton Circle, Suite 50, West Valley City, UT 84119. Please submit any new information, materials, comments, or questions concerning this finding to the above address.

FOR FURTHER INFORMATION CONTACT: Larry Crist, Field Supervisor, U.S. Fish and Wildlife Service, Utah Ecological Services Field Office, 2369 West Orton Circle, Suite 50, West Valley City, UT 84119; by telephone at 801–975–3330; or by facsimile at 801–975–3331mailto:. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific or commercial information that listing a species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we will determine that the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are threatened or endangered, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the ESA requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

On July 30, 2007, we received a petition dated July 24, 2007, from Forest Guardians (now WildEarth Guardians), requesting that the Service: (1) Consider all full species in our Mountain Prairie Region ranked as G1 or G1G2 by the organization NatureServe, except those that are currently listed, proposed for listing, or candidates for listing; and (2) list each species as either endangered or threatened. The petition included the five plant species addressed in this finding. The petition incorporated all analysis, references, and documentation provided by NatureServe in its online database at *http://www.natureserve.org/*. The document clearly identified itself as a petition and included the petitioners' identification information, as required in 50 CFR 424.14(a). We sent a letter to the petitioners, dated August 24, 2007, acknowledging receipt of the petition and stating that, based on preliminary review, we found no compelling evidence to support an emergency listing for any of the species covered by the petition.

On March 19, 2008, WildEarth Guardians filed a complaint (1:08–CV–472–CKK) indicating that the Service failed to comply with its mandatory duty to make a preliminary 90-day finding on their two multiple species petitions—one for mountain-prairie species and one for southwest species.

On June 18, 2008, we received a petition from WildEarth Guardians, dated June 12, 2008, to emergency list 32 species under the Administrative Procedure Act and the ESA. Of those 32 species, 11 were included in the July 24, 2007, petition to be listed on a nonemergency basis. Although the ESA does not provide for a petition process for an interested person to seek to have a species emergency listed, section 4(b)(7) of the ESA authorizes the Service to issue emergency regulations to temporarily list a species. In a letter dated July 25, 2008, we stated that the information provided in both the 2007 and 2008 petitions and in our files did not indicate that an emergency situation existed for any of the 11 species.

On February 5, 2009 (74 FR 6122), we published a 90-day finding on 165 species from the petition to list 206 species in the mountain-prairie region of the United States as endangered or threatened under the ESA. We found that the petition did not present substantial scientific or commercial information indicating that listing was warranted for these species and, therefore, did not initiate further status reviews in response to the petition. Two additional species were reviewed in a concurrent 90-day finding and again, we found that the petition did not present substantial scientific or commercial information indicating that listing was warranted for these species. Therefore we did not consider these two species further. For the remaining 39 species, we deferred our findings until a later date. One species of the 39 remaining species, *Sphaeralcea gierischii* (Gierisch mallow), was already a candidate species for listing; therefore, 38 species remained for consideration. On March 13, 2009, the Service and WildEarth Guardians filed a stipulated settlement in the District of Columbia Court, agreeing that the Service would submit to the **Federal Register** a finding as to whether WildEarth Guardians' petition presented substantial information indicating that the petitioned action may be warranted for 38 mountain-prairie species by August 9, 2009 (*WildEarth Guardians* vs. *Salazar* 2009, case 1:08–CV–472–CKK).

On August 18, 2009, we published a notice of 90-day finding (74 FR 41649) on 38 species from the petition to list 206 species in the mountain-prairie region of the United States as endangered or threatened under the ESA. Of the 38 species, we found that the petition presented substantial scientific and commercial information for 29 species, indicating that listing may be warranted for those 29 species. The 5 species we address in this 12-month finding were included in these 29 species. We initiated a status review of the 29 species to determine if listing was warranted. We also opened a 60-day public comment period to allow all interested parties an opportunity to provide information on the status of the 29 species. The public comment period closed on October 19, 2009. We received 224 public comments. Of these, two specifically addressed *Astragalus hamiltonii, Penstemon flowersii, Eriogonum soredium, Lepidium ostleri,* and *Trifolium friscanum.* All information received has been carefully considered in this finding. This notice constitutes the 12-month finding on the July 24, 2007, petition to list five species (*A. hamiltonii, P. flowersii, E. soredium, L. ostleri,* and *T. friscanum*) as endangered or threatened.

Species Information—Astragalus hamiltonii

Taxonomy and Species Description

Astragalus hamiltonii is a bushy perennial plant in the bean family (Fabaceae) that can grow up to 24 inches (in) (60 centimeters (cm)) tall (Welsh *et al.* 2003, p. 374). It has several sparsely leafed stems, with three to five (sometimes seven) leaflets per leaf, each 0.8 to 1.6 in (2 to 4 cm) long and 0.2 to 0.4 in (5 to 10 millimeters (mm)) wide (Heil and Melton 1995a, p. 6). The terminal leaflet (at the tip of the leaf) is typically the largest leaflet (NatureServe 2009a, p. 3). In May and June, a single *A. hamiltonii* plant will produce many flowering stalks, with each stalk bearing 7 to 30 cream-colored flowers (Welsh *et al.* 2003, p. 374; NatureServe 2009a, p. 3). The fruits are hanging pods and usually mature by the end of June (NatureServe 2009a, p. 3).

Astragalus hamiltonii was first described in 1952 (Porter 1952, pp. 159–160). Although it was once considered a variety of *A. lonchocarpus* (Isely 1983, p. 422), *A. hamiltonii* is currently accepted as a distinct species, based on leaflet characteristics and geographic segregation (Barneby 1989, p. 72; Welsh *et al.* 2003, p. 374).

Distribution and Population Status

Astragalus hamiltonii occurs generally west and southwest of Vernal, Utah. The species is found on Bureau of Land Management (BLM) land, the Uintah and Ouray Indian Reservation (hereafter "Tribal") lands, State of Utah School and Institutional Trust Lands Administration (SITLA) lands, and private lands across an approximate area 10 mile (mi) (16.1 kilometer (km)) by 20 mi (32.2 km) (Figure 1). We do not have comprehensive survey information for *A. hamiltonii.* Therefore, we do not know the full extent of the species' distribution or if the distribution has changed over time.

The Utah Natural Heritage Program (UNHP) designates 11 element occurrences for *Astragalus hamiltonii* (UNHP 2010a, entire). Element occurrences are the specific locations, or sites, where plants are documented. Distinct element occurrences are identified if there is either 0.6 mi (1 km) of unsuitable habitat or 1.2 mi (2 km) of unoccupied, suitable habitat separating them (NatureServe 2004, p. 14).

Astragalus hamiltonii element occurrences are based on collections of herbarium specimens. Two of the element occurrences identified by the UNHP were from Colorado and the southeast corner of the Uinta Basin, but we believe these locations are likely *A. lonchocarpus,* based on leaf characteristics and geographic distribution (NatureServe 2009a, p. 1; Goodrich 2010a, entire), so they are not considered further in this finding. Hereafter, we base our analysis on the remaining nine element occurrences (Table 1; Goodrich 2010b, entire).

To determine the currently known distribution of *Astragalus hamiltonii,* we mapped the nine UNHP element occurrences (Figure 1). The UNHP records element occurrences using the public land survey system to the nearest quarter-quarter of the township, range, and section (UNHP 2010a, entire). These element occurrences were the basis for our "population areas," but the population areas' boundaries were expanded to the nearest quarter-quarter of the township, range, and section, to encompass the location data from the 2010 surveys (Table 1; Goodrich 2010b, entire). This mapping approach resulted in some of the newly created population areas' perimeters eventually abutting adjacent population areas (Table 1; Figure 1). Large areas of potential habitat remain unsurveyed, so it is possible that the species is continuous across its range, or occurs outside of our identified population areas (Figure 1).

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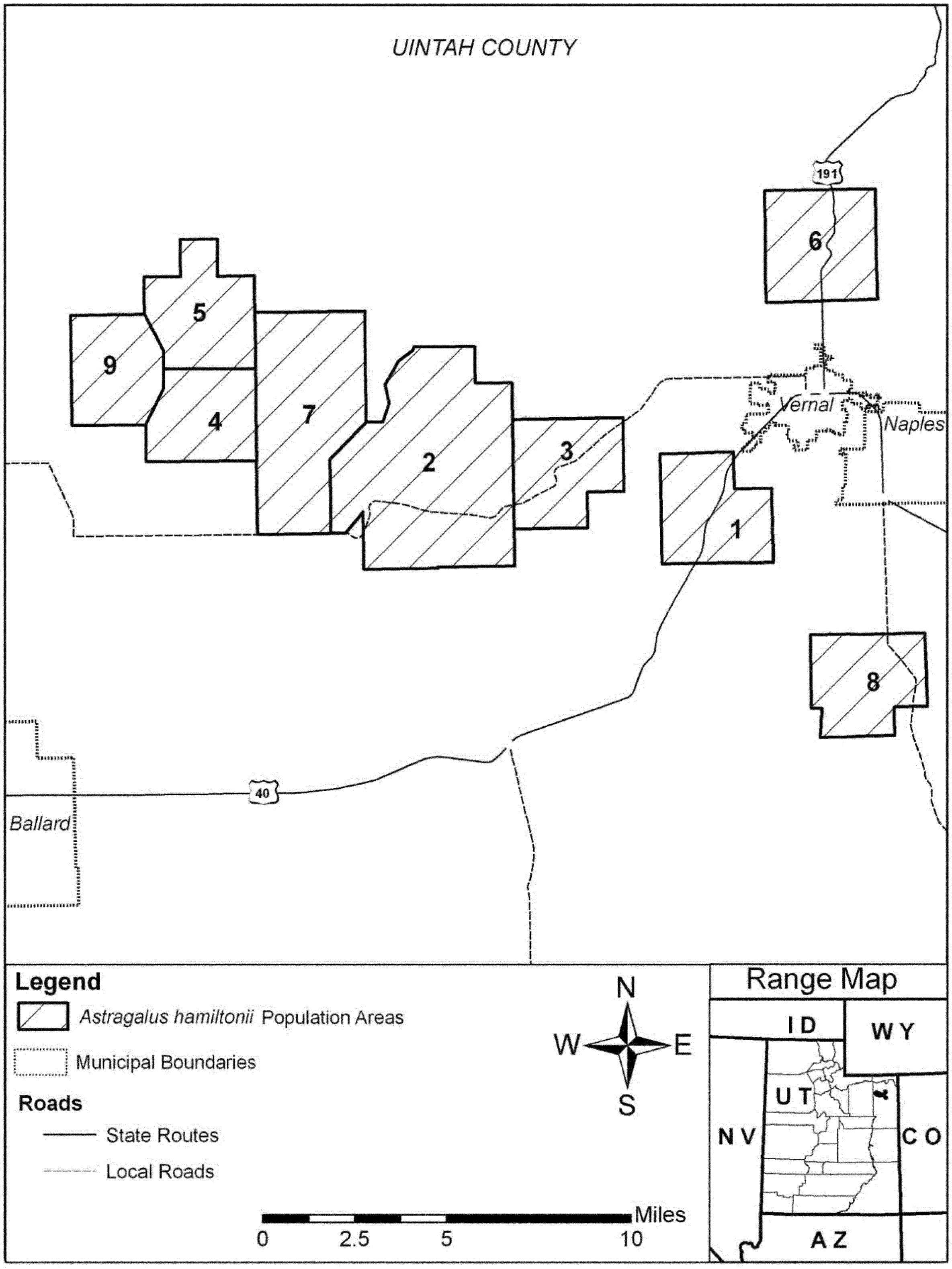

Figure 1. ***Astragalus hamiltonii*** **range and population areas.**

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TABLE 1—*Astragalus hamiltonii* PLANTS COUNTED IN 2010 SURVEYS

Population area	Percent land ownership				Number of Astragalus hamiltonii plants
	BLM	SITLA	Tribal	Private	
1	11	54	0	35	Not counted.
2	76	13	1	11	4,863.
3	44	56	0	0	544.
4	0	0	10	90	15.
5	0	0	89	11	60.
6	57	5	0	38	10.
7	0	0	52	48	345.
8	13	62	0	25	Not counted.
9	0	0	81	19	Not counted.
Total	30	18	23	28	5,837.

We do not have long-term population count or trend information. The total population of *Astragalus hamiltonii* was estimated at 10,000 to 15,000 plants in 1995 (Heil and Melton 1995a, p. 13). However, we do not know how this estimate was derived. In 2010, the U.S. Forest Service (USFS) counted over 5,800 *A. hamiltonii* individuals on BLM lands in areas west of Vernal in the vicinity of six of the element occurrences (numbers 2 to 7) (Table 1; Goodrich 2010b, entire). These were partial surveys that included revisits to six element occurrences.

Astragalus hamiltonii is distributed sparsely across the landscape at low densities, but in optimum habitat *A. hamiltonii* can grow at densities of one to two plants per square yard (yd^2) (square meter (m^2)) (Heil and Melton 1995a, p. 13). Because *A. hamiltonii* is scattered across the landscape with unsurveyed, potential habitat between known sites, we believe the known element occurrences may be linked by contiguous habitat, and may either be one large population or a series of populations within a metapopulation.

Habitat

Astragalus hamiltonii is a narrow endemic that grows on soils of the Duchesne River formation (Heil and Melton 1995a, p. 10; Goodrich 2010c, pp. 13, 15). Less frequently, it is found in Mowry Shale and Dakota formations (Welsh *et al.* 2003, p. 374). *A. hamiltonii* is typically found on benches and steep slopes at elevations of 4,900 to 6,200 feet (ft) (1,500 to 1,900 meters (m)). *A. hamiltonii* grows in red, erosive, sandy clay loam soils (Heil and Melton 1995a, pp. 10, 16; NatureServe 2009a, p. 3; Brunson 2010a, p. 1), and is associated with low-density desert shrub and juniper communities (Goodrich *et al.* 1999, p. 263; NatureServe 2009a, p. 3).

Astragalus hamiltonii grows in old road cuts and road beds, sometimes quite robustly and producing abundant flowers and fruit (Goodrich *et al.* 1999, p. 263). Therefore, we believe the species may be able to tolerate moderate soil disturbances (Neese and Smith 1982, p. 36; Goodrich *et al.* 1999, p. 263).

Life History

Astragalus hamiltonii growth, seedling establishment, and juvenile mortality are probably correlated with rainfall (Heil and Melton 1995a, p. 14). We do not know the reproductive system for this species, but it is assumed to reproduce mainly by outcrossing (cross-fertilization) (Heil and Melton 1995a, p. 14). Plants that are obligate outcrossers are self-incompatible, meaning they cannot fertilize themselves and, therefore, rely on other individuals of differing genetic make-up to reproduce (Stebbins 1970, p. 310).

Summary of Information Pertaining to the Five Factors—*Astragalus hamiltonii*

Section 4 of the ESA (16 U.S.C. 1533) and implementing regulations (50 CFR part 424) set forth procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the ESA, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information pertaining to *Astragalus hamiltonii* for the five factors provided in section 4(a)(1) of the ESA.

In considering what factors might constitute threats to a species, we must look beyond the exposure of the species to a particular factor to evaluate whether the species may respond to that factor in a way that causes actual impacts to the species. If there is exposure to a factor and the species responds negatively, the factor may be a threat and, during the status review, we attempt to determine how significant a threat it is. The threat is significant if it drives, or contributes to, the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined in the ESA. However, the identification of factors that could impact a species negatively may not be sufficient to compel a finding that the species warrants listing. The information must include evidence sufficient to suggest that these factors are operative threats that act on the species to the point that the species may meet the definition of endangered or threatened under the ESA.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The following factors may affect the habitat or range of *Astragalus hamiltonii:* (1) Conversion to agricultural use, (2) livestock grazing, (3) recreational activities, (4) oil and gas exploration and development, (5) nonnative invasive species, and (6) tar sands extraction.

(1) Conversion to Agricultural Use

Astragalus hamiltonii grows on private and Tribal lands that can be used for agriculture. Agricultural land conversion is a change in land use to an agricultural use, including crops and pastures. The conversion to agricultural use results in the loss and fragmentation of native plant habitats, including habitats of *A. hamiltonii*.

Conversion of natural lands to agriculture historically impacted populations of *Astragalus hamiltonii* (Heil and Melton 1995a, p. 16), particularly in the four population areas where land ownership is private or Tribal. However, most of this development was limited to lower-lying areas outside of *A. hamiltonii* habitat (National Agriculture Imagery Program (NAIP) 2009, entire). It is likely that most of the suitable land in Uintah County, where irrigation water was available, was converted to agricultural use by 1970 (Hilton 2010, p. 1). Major changes in the amount of agricultural land in Uintah County are not expected in the future (Hilton 2010, p. 2). Although historical conversion to agricultural use may have negatively impacted *A. hamiltonii,* we have no evidence to indicate that this factor is a threat to this species now or for the foreseeable future.

(2) Livestock Grazing

Livestock grazing may result in the direct loss or damage to plants and their habitat through trampling, soil compaction, increased erosion, invasion of noxious weeds, and disturbance to pollinators (Kauffman *et al.* 1983, p. 684; Fleischner 1994, entire; Kearns *et al.* 1998, p. 90; DiTomaso 2000, p. 257). All BLM lands where *Astragalus hamiltonii* is documented are within grazing allotments, including portions of population areas 1, 2, 3, 6, and 8 (*see* Table 1). In 2010, of all *A. hamiltonii* counted, 5,417 individuals (93 percent) occur in existing grazing allotments. We have no information on the extent of grazing on private or Tribal lands.

We do not have any information concerning how grazing may affect this species. However, cattle tend to spend more time on gentle slopes (Van Buren 1982 in Fleischner 1994, p. 637). *Astragalus hamiltonii* grows on steep, erosive hillsides, and we believe this habitat preference offers some protection from livestock grazing and trampling. In addition, the grazing allotments that overlap *A. hamiltonii* sites on BLM land are fall and winter allotments (BLM 2008a, Appendix J); thus, *A. hamiltonii* is not actively growing or palatable when livestock are grazing these areas.

In summary, the species occurs in areas that are subject to livestock grazing. However, the fall-winter season of grazing greatly reduces the chance that the plants are eaten by livestock. *Astragalus hamiltonii* typically grows on steep slopes and can occur on disturbed soils, which minimizes negative effects from livestock trampling within *A. hamiltonii* habitat. Therefore, we do not believe that livestock grazing is a threat to *A. hamiltonii* now or for the foreseeable future.

(3) Recreational Activities

Off-highway vehicle (OHV) and recreational trail use (*e.g.,* mountain bikes and motorized bikes) may result in direct loss or damage to plants and their habitat through soil compaction, increased erosion, invasion of noxious weeds, and disturbance to pollinators and their habitat (Eckert *et al.* 1979, entire; Lovich and Bainbridge 1999, p. 316; Ouren et al. 2007, entire; BLM 2008a, pp. 4–94; Wilson *et al.* 2009, p. 1).

The OHV and recreational trail use occurs across the landscape where *Astragalus hamiltonii* grows. The OHV use is largely limited to existing roads and trails on BLM lands, which account for approximately a third of *A. hamiltonii's* known range (Table 1) (BLM 2008b, p. 46). There are no OHV restrictions on private or Tribal lands, but the species' association with steep, erosive hillsides likely minimizes OHV use in the species' habitat.

Unauthorized off-road use occurs in *Astragalus hamiltonii* habitat in population area 2 (Brunson 2010a, p. 3). However, we observed plants growing directly next to these recreational trails (Brunson 2010a, p. 3). As previously described, *A. hamiltonii* grows along road cuts and other disturbed areas, suggesting it can persist with some level of disturbance. We do not believe that the observed unauthorized off-road use is negatively impacting *A. hamiltonii.*

In summary, the species' habitat preference for steep slopes, its ability to grow in disturbed soils, and off-road restrictions on BLM lands minimize the impacts of recreational use to *Astragalus hamiltonii.* Thus, we do not believe that recreational activities are a threat to *A. hamiltonii* now or for the foreseeable future.

(4) Oil and Gas Exploration and Development

The effects of oil and gas exploration and development include increased vehicle traffic and removal of soil and vegetation when wells, roads, and associated infrastructure are built (BLM 2008c, pp. 448–449). These disturbances can affect rare plant species through habitat destruction, habitat fragmentation, soil disturbance, spread of invasive weeds, and production of fugitive dust (particulate matter suspended in the air by wind and human activities) (BLM 2008c, pp. 448–449).

Energy exploration and development occurs across *Astragalus hamiltonii's* known range, but only in localized areas with small numbers of wells (Utah Division of Oil, Gas, and Mining (UDOGM) 2010, p. 1). Only one well is producing in *A. hamiltonii* habitat, and another well is currently being drilled. Seventeen wells were plugged and abandoned, most prior to 1976 (Gordon 2010a, pers. comm.; UDOGM 2010, p. 1). Plugged and abandoned wells are no longer in use and are usually recontoured and revegetated to match the surrounding landscape (Gordon 2010b, pers. comm.). Plugged and abandoned wells also do not receive regular truck traffic like producing wells, so fugitive dust is less of an issue (Gordon 2010b, pers. comm.). Occasionally, plugged and abandoned wells may be reopened, disturbing areas that were previously reclaimed. If all the plugged and abandoned wells in *A. hamiltonii* habitat were reopened, this is still a small number of wells throughout the species' range.

Large portions of population areas 1, 2, 3, 6, 7, and 8 (Table 1) are overlapped by oil and gas leases on state, Tribal, and BLM land. Two BLM oil and gas leases in population area 2 overlap more than 4,000 known *Astragalus hamiltonii* individuals (UDOGM, 2010, p. 2). However, no oil or gas is being produced under these leases (UDOGM 2010, p. 2).

The lack of oil and gas development in *Astragalus hamiltonii* habitat is most likely because there is not enough of those products currently obtainable to be economically feasible using current extraction technology (Doyle 2010, pers. comm.; Sparger 2010, pers. comm.) rendering dense energy developments unlikely in this area for the next 20 years (BLM 2008c, p. 486). Although some oil and gas development may occur in *A. hamiltonii* habitat, we would not expect it at densities that would significantly impact the species. Furthermore, *A. hamiltonii* is adapted to at least some disturbance and may be afforded additional protection by its tendency to grow on steep slopes that may be unsuitable for energy development. Therefore, oil and gas development is unlikely to occur in the foreseeable future at densities that would significantly impact the species.

In summary, there is little oil and gas development within *Astragalus hamiltonii* habitat. Based on current technologies and low economic feasibility, we do not anticipate substantial development in the foreseeable future that would meaningfully impact the species. Therefore, we do not believe that oil and gas exploration and development is a threat to *A. hamiltonii* now or in the foreseeable future.

(5) Nonnative Invasive Species

The spread of nonnative invasive species is considered the second largest threat to imperiled plants in the United States (Wilcove *et al.* 1998, p. 608). Invasive plants—specifically exotic annuals—negatively affect native vegetation, including rare plants. One of the most substantial effects is the change in vegetation fuel properties that, in turn, alter fire frequency, intensity, extent, type, and seasonality (Menakis *et al.* 2003, pp. 282–283; Brooks *et al.* 2004, p. 677; McKenzie *et al.* 2004, p. 898). Shortened fire return intervals make it difficult for native plants to reestablish or compete with invasive plants (D'Antonio and Vitousek 1992, p. 73).

Invasive plants can exclude native plants and alter pollinator behaviors (D'Antonio and Vitousek 1992, pp. 74–75; DiTomaso 2000, p. 257; Mooney and Cleland 2001, p. 5449; Levine *et al.* 2003, p. 776; Traveset and Richardson 2006, pp. 211–213). For example, *Bromus tectorum* outcompetes native species for soil nutrients and water (Melgoza *et al.* 1990, pp. 9–10; Aguirre and Johnson 1991, pp. 352–353).

Bromus tectorum (cheatgrass) is a particularly problematic nonnative invasive annual grass in the Intermountain West. If already present in the vegetative community, *B. tectorum* increases in abundance after a wildfire, increasing the chance for more frequent fires (D'Antonio and Vitousek 1992, pp. 74–75). In addition, *B. tectorum* invades areas in response to surface disturbances (Hobbs 1989, pp. 389, 393, 395, 398; Rejmanek 1989, pp. 381–383; Hobbs and Huenneke 1992, pp. 324–325, 329, 330; Evans *et al.* 2001, p. 1308). *B. tectorum* is likely to increase due to climate change (*see* Factor E) because invasive annuals increase biomass and seed production at elevated levels of carbon dioxide (Mayeux *et al.* 1994, p. 98; Smith *et al.* 2000, pp. 80–81; Ziska *et al.* 2005, p. 1328).

Bromus tectorum occurs in *Astragalus hamiltonii* habitat (Brunson 2010a, p. 1). However, *B. tectorum* and other invasive species are uncommon in many of the erosive red soils that *A. hamiltonii* prefers (Brunson 2010a, p. 1; Goodrich 2010c, p. 59). We do not anticipate a high degree of surface disturbances in *A. hamiltonii* habitats in the foreseeable future from other factors, such as livestock grazing or oil and gas development (Factor A).

In summary, we know that invasive species can impact plant communities by increasing fire frequencies, outcompeting native species, and altering pollinator behaviors. These factors could be exacerbated by climate change patterns. However, invasive species do not occur in high densities in *Astragalus hamiltonii* habitat. Based on this fact and the limited amount of surface-disturbing activities within the species' habitat, we do not anticipate that nonnative invasive species densities will increase significantly, even with climate change. Therefore, we do not believe nonnative invasive species, or associated fires, are a threat to *A. hamiltonii* now or for the foreseeable future.

(6) Tar Sands Extraction

The Duchesne River Formation, where most known *Astragalus hamiltonii* individuals occur, would be one of the formations targeted by tar sands extraction (BLM 2008d, p. 9). Tar sands extraction disturbs the soil surface and removes existing vegetation (BLM 2008d, p. 27). Impacts are similar to those described above in the Oil and Gas Exploration and Development section. Tar sands mining could result in the loss of *A. hamiltonii* individuals and their habitats.

Tar sands leases are proposed for sale on BLM and State Lands along Asphalt Ridge southwest of Vernal, Utah (UDOGM 2010, p. 3). These lease parcels do not overlap known *Astragalus hamiltonii* sites, but they overlap with unsurveyed potential habitat within portions of population area 1.

Tar sands leases are still in the proposal phase and there are currently no commercial tar sands operations on public lands in Utah (BLM 2008d, p. 4). High production costs and environmental issues are barriers to tar sands development in the United States (Bartis *et al.* 2005, pp. 15, 53; Engemann and Owyang 2010, entire). Tar sands extraction may be feasible if the cost of crude oil becomes high enough in the future, but these high price projections are not expected to be realized until at least 2030 (Engemann and Owyang 2010, p. 2), and even then the environmental issues will need to be resolved.

In summary, tar sands leases do not overlap a majority of *Astragalus hamiltonii* habitat. Large-scale, commercially viable development is not anticipated in the foreseeable future. Therefore, tar sands development is not considered a threat to *A. hamiltonii* now or in the foreseeable future.

Summary of Factor A

Based on the best available information, we have concluded that conversion to agricultural use, livestock grazing, recreational activities, nonnative invasive species, oil and gas exploration and development, or tar sands extraction do not threaten *Astragalus hamiltonii* now or in the foreseeable future. Conversion to agricultural use probably resulted in historical loss of some *A. hamiltonii* habitat, but we do not anticipate ongoing conversions to agricultural use in the future. In addition, most agricultural use occurs in low-lying areas outside of the species' distribution. *A. hamiltonii* is protected from livestock grazing due to its habitat preference for steep hillsides and the fall-winter grazing season of the associated allotments. Recreational use is not a threat to *A. hamiltonii* because BLM restricts off-trail use. Where off-trail use occurs on private, State, and Tribal lands, the adaptation of *A. hamiltonii* to steep slopes and disturbed soils allows it to persist with moderate habitat disturbance. *A. hamiltonii* soils do not appear to support invasive plant species at densities needed to sustain wildfires. We also do not anticipate increased surface disturbances that could encourage the establishment of invasive species in *A. hamiltonii* habitat. Although energy development leases overlap *A. hamiltonii* habitat, it is unlikely that current technologies and economic conditions will support oil and gas or tar sands development in this area in the foreseeable future. Thus, the present or threatened destruction, modification, or curtailment of the habitat or range is not a threat to *A. hamiltonii* now or in the foreseeable future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Astragalus hamiltonii is not a plant of horticultural interest. We are not aware of any instances where *A. hamiltonii* was collected from the wild other than as voucher specimens to document occurrences (UNHP 2010a, entire). Therefore, we do not consider overutilization a threat to the species now or in the foreseeable future.

Factor C. Disease or Predation

We do not have any information indicating that disease impacts *Astragalus hamiltonii.* We also do not have information on the effects of herbivory (eating) by livestock (see the Livestock Grazing section above), wildlife, or insects. However, we do not believe herbivory from livestock is a concern due to the steepness of the terrain on which the plant is located and the time of year grazing occurs in *A. hamiltonii* habitat (*see* Factor A, Livestock Grazing). Based on the best available information, we do not believe *A. hamiltonii* is threatened by disease or predation now or for the foreseeable future.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

There are no laws protecting plants on private, State, or Tribal lands in Utah. A third of *Astragalus hamiltonii* individuals are found on BLM land. *A. hamiltonii* is listed as a bureau sensitive plant for the BLM. Limited policy-level protection by the BLM is afforded through the Special Status Species Management Policy Manual # 6840 which forms the basis for special status species management on BLM lands (BLM 2008e, entire).

Despite the lack of regulatory mechanisms to protect *Astragalus hamiltonii,* we found that there are no threats to the species (Factors A, B, C, and E) that require regulatory mechanisms to protect the species. Therefore, we do not consider the inadequacy of regulatory mechanisms a threat to this species now or for the foreseeable future.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Natural and manmade factors affecting *Astragalus hamiltonii* include: (1) Small population size and (2) climate change and drought.

(1) Small Population Size

We lack information on the population genetics of *Astragalus hamiltonii,* and as a probable outcrosser, this species could potentially be subject to the negative effects of small population size. As previously described (*see* Life History, above), plants that are obligate outcrossers cannot fertilize themselves and rely on other individual plants of differing genetic make-up to reproduce (Stebbins, 1970, p. 310). Therefore, the fewer plants that are located at a site (*i.e.,* small population size), the less chance exists for sufficient cross-fertilization.

Small populations and species with limited distributions are vulnerable to relatively minor environmental disturbances (Given 1994, pp. 66–67). Small populations also are at an increased risk of extinction due to the potential for inbreeding depression, loss of genetic diversity, and lower sexual reproduction rates (Ellstrand and Elam 1993, entire; Wilcock and Neiland 2002, p. 275). Lower genetic diversity may, in turn, lead to even smaller populations by decreasing the species' ability to adapt, thereby increasing the probability of population extinction (Barrett and Kohn 1991, pp. 4, 28; Newman and Pilson 1997, p. 360).

We do not believe small population size is a concern for *Astragalus hamiltonii. A. hamiltonii* grows robustly and in high densities with many flowers and fruits (Goodrich 2010b, entire; Goodrich 2010c, p. 26). Although the species exists in a relatively small area (known distribution is 200 square miles (mi^2) (518 square kilometers (km^2)), it occurs across its range in a scattered—and potentially continuous—distribution. There are also large areas of suitable habitat that remain unsurveyed, so the species may be more widely distributed.

Astragalus hamiltonii's scattered distribution may contribute to its overall viability and potential resilience (Goodrich 2010b, p. 89). For example, small-scale stochastic events, such as the erosion of a hillside during a flood event, would probably destroy only a small portion of the known individuals of *A. hamiltonii.* It is possible that a landscape-level event, such as a wildfire, could destroy most known *A. hamiltonii* individuals, but the sparseness of the vegetation and the lack of fine fuels in *A. hamiltonii* habitat makes this event unlikely (Wright and Bailey 1982, p. 1; Olmstead 2010, pers. comm.). The lack of other surface-disturbing threats (*see* Factor A) also leads us to believe that the species' current distribution and population size will remain intact.

In the absence of information identifying threats to the species and linking those threats to the rarity of the species, we do not consider rarity alone to be a threat. A species that has always been rare, yet continues to survive, could be well equipped to continue to exist into the future. This may be particularly true for *Astragalus hamiltonii,* which is adapted to recolonize disturbed sites. Many naturally rare species have persisted for long periods within small geographic areas, and many naturally rare species exhibit traits that allow them to persist, despite their small population sizes. Consequently, the fact that a species is rare does not necessarily indicate that it may be in danger of extinction in the foreseeable future.

Based on *Astragalus hamiltonii's* apparently robust reproductive effort, scattered distribution, and lack of other threats, we believe that small population size is not a threat to this species now or for the foreseeable future.

(2) Climate Change and Drought

Climate change is likely to affect the long-term survival and distribution of native species, such as *Astragalus hamiltonii,* through changes in temperature and precipitation. Hot extremes, heat waves, and heavy precipitation will increase in frequency, with the Southwest experiencing the greatest temperature increase in the continental United States (Karl *et al.* 2009, pp. 28, 129). Approximately 20 to 30 percent of plant and animal species are at increased risk of extinction if increases in global average temperature exceed 2.7 to 4.5 degrees Fahrenheit (°F) (1.5 to 2.5 degrees Celsius (°C)) (Intergovernmental Panel on Climate Change (IPCC) 2007, p. 48). In the southwestern United States, average temperatures increased approximately 1.5 °F (0.8 °C) compared to a 1960 to 1979 baseline (Karl *et al.* 2009, p. 129). By the end of this century, temperatures are expected to warm a total of 4 to 10 °F (2 to 5 °C) in the Southwest (Karl *et al.* 2009, p. 129).

Annual mean precipitation levels are expected to decrease in western North America and especially the southwestern States by mid century (IPCC 2007, p. 8; Seager *et al.* 2007, p. 1181). Throughout *Astragalus hamiltonii's* range, precipitation is predicted to increase 10 to 15 percent in the winter, decrease 5 to 15 percent in spring and summer, and remain unchanged in the fall under the highest emissions scenario (Karl *et al.* 2009, p. 29). The levels of aridity of recent drought conditions and perhaps those of the 1950s drought years will become the new climatology for the southwestern United States (Seager *et al.* 2007, p. 1181). Much of the Southwest remains in a 10-year drought, "the most severe western drought of the last 110 years" (Karl *et al.* 2009, p. 130). Although droughts occur more frequently in areas with minimal precipitation, even a slight reduction from normal precipitation may lead to severe reductions in plant production. Therefore, the smallest change in environmental factors, especially precipitation, plays a decisive role in plant survival in arid regions (Herbel *et al.* 1972, p. 1084).

Atmospheric levels of carbon dioxide are expected to double before the end of the 21st century, which may increase the dominance of invasive grasses leading to increased fire frequency and severity across western North America (Brooks and Pyke 2002, p. 3; IPCC 2002, p. 32; Walther *et al.* 2002, p. 391).

Elevated levels of carbon dioxide lead to increased invasive annual plant biomass, invasive seed production, and pest outbreaks (Smith *et al.* 2000, pp. 80–81; IPCC 2002, pp. 18, 32; Ziska *et al.* 2005, p. 1328) and will put additional stressors on rare plants already suffering from the effects of elevated temperatures and drought.

No population trend data are available for *Astragalus hamiltonii,* but drought conditions led to a noticeable decline in survival, vigor, and reproductive output of other rare plants in the Southwest during the drought years of 2001 through 2004 (Anderton 2002, p. 1; Van Buren and Harper 2002, p. 3; Van Buren and Harper 2004, entire; Hughes 2005, entire; Clark and Clark 2007, p. 6; Roth 2008a, entire; Roth 2008b, pp. 3–4).

As discussed in the Life History section above, *Astragalus hamiltonii* seedling establishment is probably correlated with rainfall (Heil and Melton 1995a, p. 14); therefore, reduced precipitation may reduce seedling establishment. Additionally, the relatively localized distribution of *A. hamiltonii* may make this species more susceptible to landscape-level stochastic extinction events, such as regional drought. Despite these potential vulnerabilities, *A. hamiltonii* appears well-adapted to a dry climate and can quickly colonize after disturbance. Plants growing in high-stress landscapes are adapted to stress, and drought-adapted species may experience lower mortality during severe droughts (Gitlin *et al.* 2006, pp. 1477, 1484).

In summary, climate change is affecting and will affect temperature and precipitation events in the future. We expect that *Astragalus hamiltonii,* like other narrow endemics, may be negatively affected by climate change related drought. However, we believe that *A. hamiltonii's* adaptation to growing in high-stress environments renders this species less susceptible to negative effects from climate change. Although we believe climate change will impact plants in the future, the available information is too speculative to determine the likelihood of this potential threat to *A. hamiltonii.* Therefore, based on the best scientific and commercial information available, we conclude that climate change is not a threat to *A. hamiltonii* now or for the foreseeable future.

Summary of Factor E

We assessed the potential risks of small population size, climate change, and drought to *Astragalus hamiltonii.* There is no evidence that the species' small population size is a threat to *A. hamiltonii.* Rather, small, scattered populations are likely an evolutionary adaptation of this species. Climate change and resulting drought may affect *A. hamiltonii's* growth and reproductive success. However, *A. hamiltonii* is adapted to a landscape where drought naturally occurs and is able to rapidly colonize after disturbance. In addition, as described in Factor A, there are no threats to the species that would result in significant loss or fragmentation of available habitat, and thus there are no cumulative effects to exacerbate the threat of climate change. We currently lack sufficient information that other natural or manmade factors rise to the level of a threat to *A. hamiltonii* now or for the foreseeable future.

Finding

As required by the ESA, we conducted a review of the status of the species and considered the five factors in assessing whether *Astragalus hamiltonii* is endangered or threatened throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by *A. hamiltonii.* We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with recognized *A. hamiltonii* experts and other Federal, State, and Tribal agencies.

The primary factor potentially impacting *Astragalus hamiltonii* is future energy development (oil, gas, and tar sands). However, energy development is not likely to occur on a broad scale throughout this species' range in the foreseeable future. Furthermore, the best available information shows that *A. hamiltonii* can tolerate some habitat disturbances. Other factors affecting *A. hamiltonii*—including land conversion to agricultural use, grazing, recreation, nonnative invasive species, and small population size—are either limited in scope, or we do not have evidence that supports these factors adversely impacting the species as a whole. We have no evidence that overutilization, disease, and predation are affecting this species. Although climate change will likely impact plants in the future, we do not have enough information to determine that climate change will elicit a species-level response from *A. hamiltonii.* Finally, because none of these factors rises to the level of a threat, the inadequacy of regulatory mechanisms does not negatively affect *A. hamiltonii.*

Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the factors analyzed above are not of sufficient imminence, intensity, or magnitude to indicate that *Astragalus hamiltonii* is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout its range. Therefore, we find that listing *A. hamiltonii* as a threatened or endangered species throughout its range is not warranted.

Significant Portion of the Range

Having determined that *Astragalus hamiltonii* does not meet the definition of a threatened or endangered species, we must next consider whether there are any significant portions of the range where *A. hamiltonii* is in danger of extinction or is likely to become endangered in the foreseeable future.

In determining whether a species is threatened or endangered in a significant portion of its range, we first identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be significant and threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) The portions may be significant, and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that are not significant, such portions will not warrant further consideration.

If we identify portions that warrant further consideration, we then determine whether the species is threatened or endangered in these portions of its range. Depending on the biology of the species, its range, and the threats it faces, the Service may address either the significance question or the status question first. Thus, if the Service considers significance first and determines that a portion of the range is not significant, the Service need not determine whether the species is threatened or endangered there. Likewise, if the Service considers status first and determines that the species is not threatened or endangered in a portion of its range, the Service need not determine if that portion is significant. However, if the Service determines that both a portion of the range of a species is significant and the species is threatened or endangered there, the Service will specify that portion of the range as threatened or endangered under section 4(c)(1) of the ESA.

We have no evidence that any particular population or portion of the range of *Astragalus hamiltonii* is critical to the species' survival. Although population area 2 appears to have a majority of the known *Astragalus hamiltonii* individuals, this area has received a majority of the search effort. *A. hamiltonii* may actually occur continuously across its known range, but range-wide surveys have not been done. The population areas delineated in this document were derived from existing data and information; however, information on the species' distribution and numbers may change with more survey effort. Additionally, potential threats to the species are essentially uniform throughout its range. Therefore, we do not find that *A. hamiltonii* is in danger of extinction now, nor is it likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Therefore, listing *A. hamiltonii* as threatened or endangered under the ESA is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, *Astragalus hamiltonii* to our Utah Ecological Services Field Office (*see* **ADDRESSES** section) whenever such information becomes available. New information will help us monitor *A. hamiltonii* and encourage its conservation. If an emergency situation develops for *A. hamiltonii,* or any other species, we will act to provide immediate protection.

Species Information—Penstemon flowersii

Taxonomy and Species Description

Penstemon flowersii is an herbaceous plant in the figwort family (Scrophulariaceae) (Welsh *et al.* 2003, p. 624). This perennial plant can grow up to 14 in (36 cm) tall, with many branches that bloom dusty pink in May and June (Heil and Melton 1995b, pp. 6–7). It has dry, multi-part fruits less than 0.4 in (1 cm) long that split open when mature to release seeds (Neese and Welsh 1983, p. 429). *P. flowersii* has a poorly developed or absent basal rosette (a dense radiating cluster of leaves at the base of the plant) and smooth, thick leaves (Heil and Melton 1995b, pp. 6–7).

Penstemon flowersii was first described in 1983 by Neese and Welsh, and is an accepted taxonomic entity (Welsh *et al.* 2003, p. 624). *P. flowersii* resembles other species in the genus and is closest vegetatively to *P. carnosus* (Heil and Melton 1995b, p. 8), but *P. flowersii* is distinguished by its smaller stature and dusty pink flowers (Neese and Welsh 1983, pp. 429–431*). P. flowersii* is closely related to *P. immanifestus,* a species that grows elsewhere in Nevada and Utah but has a more prominently bearded staminode (sterile male reproductive part found in the flower) (Heil and Melton 1995b, p. 8).

Distribution and Population Status

Penstemon flowersii is found only in the Uinta Basin near Roosevelt, Utah. Its distribution straddles the Duchesne-Uintah County line (Figure 2). The species occurs across an area approximately 20 mi (32 km) by 4 mi (6.4 km) from Bridgeview to Randlett, Utah, in seven element occurrences (UNHP 2010b, entire) (*see* Distribution and Population Status section for *Astragalus hamiltonii* above for a complete definition of element occurrence). These seven element occurrences are not numbered consecutively because the UNHP combined previously disjunct element occurrences based on available information. As with *A. hamiltonii,* the element occurrences are recorded to the nearest quarter-quarter of the township, range, and section. This method of recording species locations gives the impression that element occurrences either overlap or join to form a continuous population. However, comprehensive surveys have not been done for all suitable habitats within an element occurrence, so we do not know if the population is continuous throughout the species' range.

Penstemon flowersii was recently identified north of element occurrence 9 (Spencer 2010a, entire). We refer to this location as the "new site" because it is not yet assigned to an element occurrence. At this time, we are unsure as to whether or not this new site will be designated as a new element occurrence or if it will be included in an existing element occurrence.

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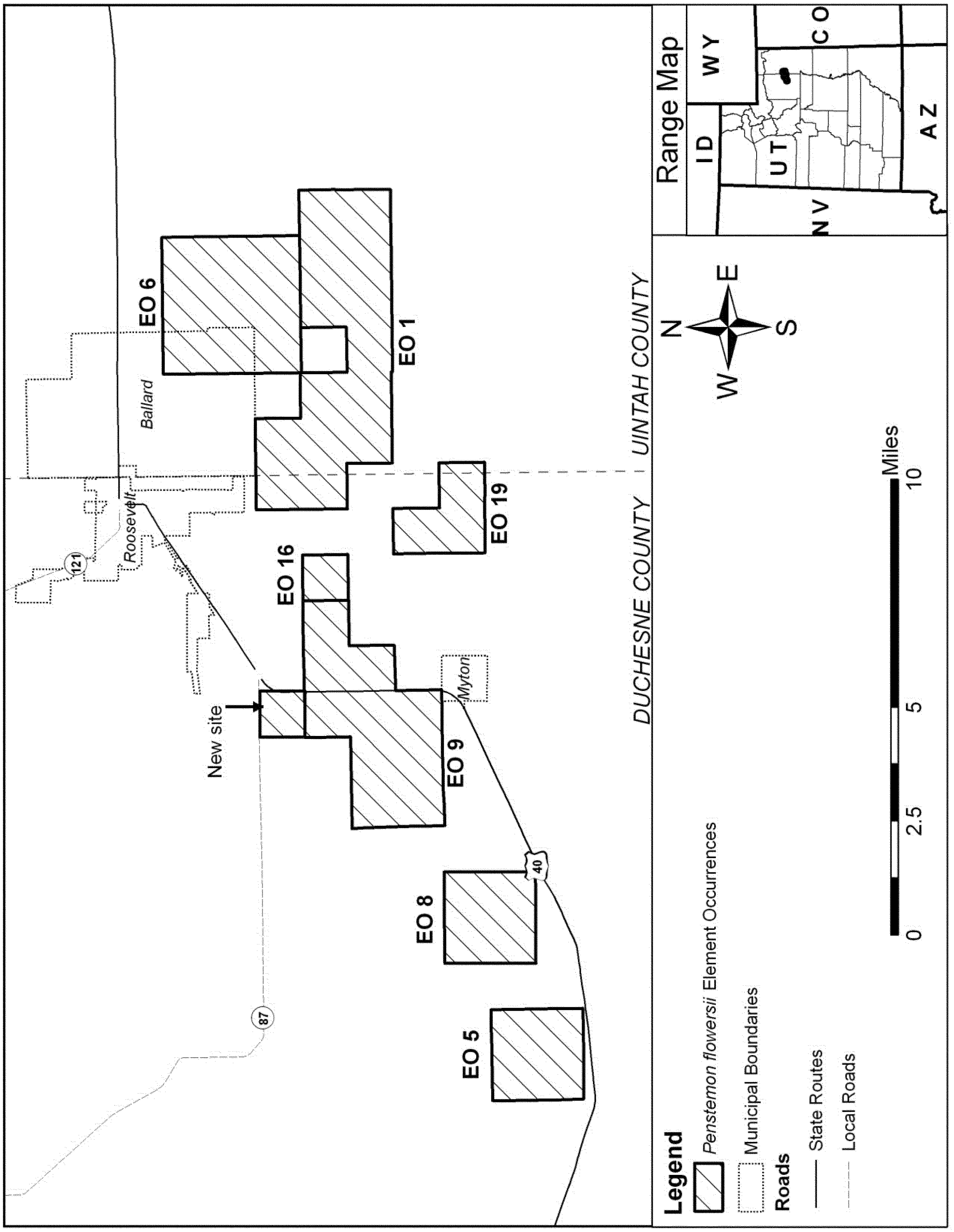

Figure 2. *Penstemon flowersii* range and element occurrences.

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Penstemon flowersii's distribution is patchy, although some sites can have moderately dense distribution with up to 10 plants in 1 yd^2 (1 m^2) (Heil and Melton 1995b, pp. 12–14). We do not know if the distribution of *P. flowersii* has changed over time because comprehensive surveys were not conducted for this species.

Penstemon flowersii is found almost completely on private and Tribal lands (Table 2), with the exception of element occurrence 19, which is on property managed by the Utah Reclamation Mitigation and Conservation Commission for the U.S. Bureau of Reclamation (BOR) (UNHP 2010b, entire).

TABLE 2—ESTIMATED NUMBER OF PENSTEMON FLOWERSII PLANTS

Element occurrence	Percent land ownership			Number of penstemon flowersii plants	Year of last survey
	Private	Tribal	BOR		
1	75	25	0	2,000–13,000	2001
5	94	6	0	101–1,000	1995
6	78	22	0	No count	1982
8	71	29	0	61–71	2004
9	91	9	0	51–100	2001
16	100	0	0	4	2001
19	44	21	35	552	2001
New site	100	0	0	29	2010
Total	79	19	2	2,798–14,756.	

The total number of *Penstemon flowersii* individuals in Table 2 was derived from actual counts or estimates provided for each element occurrence. However, these counts do not include all known locations (*e.g.,* private lands or BOR lands) for the species. The total number of *P. flowersii* individuals was previously estimated from 15,000 to 20,000 on private lands alone, not including Tribal land (Heil and Melton 1995b, p. 13; Franklin 2005, p. 131). We do not know how this estimate was derived.

We cannot make a more accurate estimate for the total number of *Penstemon flowersii* because many sites on private and Tribal lands are inaccessible, and *P. flowersii* population numbers fluctuate widely from year to year (Heil and Melton 1995b, p. 16; Prevedel 2001 pers. comm. in Franklin 2005, p. 131). Therefore, we do not have accurate population counts or trend information for this species.

Habitat

Penstemon flowersii is a narrow endemic that grows in *Atriplex confertifolia* (shadscale) communities on semibarren, gravelly clay slopes of the Uinta Formation (Heil and Melton 1995b, p. 9) at elevations ranging from 4,890 to 5,410 ft (1,490 to 1,650 m) (NatureServe 2009b, p. 2). It is found on both disturbed and undisturbed sites (Heil and Melton 1995b, p. 10).

Life History

We know little of *Penstemon flowersii's* life history. Plant growth, seedling establishment, and juvenile mortality for this species are probably correlated with rainfall (Heil and Melton 1995b, p. 14). Reproduction and recruitment were noted at multiple sites across all element occurrences (UNHP 2010b, entire; Brunson 2010b, p. 1). One site had an estimated age structure of 4 percent seedlings and 96 percent mature adults, indicating that recruitment is occurring (UNHP 2010b, entire). Pollinators observed visiting *P. flowersii* include species of the order Hymenoptera: *Anthophora affabilis, A. bomboides,* and a species in the genus *Osmia* (Tepedino 2007, pers. comm. in Frates 2010, p. 32).

Summary of Information Pertaining to the Five Factors—*Penstemon flowersii*

In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information pertaining to *Penstemon flowersii* in relation to the five factors provided in section 4(a)(1) of the ESA (*see* the full description of these five factors in the Summary of Information Pertaining to the Five Factors section for *Astragalus hamiltonii* above).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The following factors may affect the habitat or range of *Penstemon flowersii:* (1) Conversion to agricultural use/livestock grazing, (2) recreational activities, (3) oil and gas exploration and development, (4) nonnative invasive species, and (5) rural residential development.

(1) Conversion to Agricultural Use/Livestock Grazing

For *Penstemon flowersii,* we combined two factors, conversion to agricultural use and livestock grazing, into one discussion because both of these factors occur on private lands. Historically, conversion of natural lands to agricultural use likely impacted *Penstemon flowersii* populations (Heil and Melton 1995b, pp. 8, 16), resulting in lower population numbers and habitat fragmentation. We believe the species was historically distributed in the low-lying areas because those areas that were not converted to agricultural use still contain *P. flowersii* plants (Franklin 2005, p. 131).

Most of the suitable land in Duchesne and Uintah Counties was converted to agricultural use by 1970 (NAIP 2009, p. 2; Hilton 2010, p.1). Major changes in the amount of agricultural land in these counties are not expected in the future (Hilton 2010, p. 2). Therefore, we would not expect future agricultural conversion in these areas at a level that would threaten the species as a whole.

The upper benches on private land where *Penstemon flowersii* now grows appear as nonirrigated terrain in digital imagery (NAIP 2009, p. 2), and thus these areas are not likely used for agriculture. It is possible that most of these nonirrigated lands are used for rangeland grazing. Heavy grazing was noted at one site (UNHP 2010b, entire), and, as previously described, livestock can graze and trample plants (BLM 2008c, p. 485). However, anecdotal observations indicate that this plant is not a preferred browse species by grazing livestock (Holmgren 2009 pers. comm. in Frates 2010, p. 35), and the species can tolerate some level of soil disturbances (*see* Habitat). *P. flowersii* was noted as thriving in pastures (Holmgren 2009 pers. comm. in Frates 2010, p. 35), so it appears that livestock grazing does not negatively impact the species. In summary, we have no information suggesting that conversion of habitat to agricultural use or livestock grazing are threats to *P. flowersii* now or for the foreseeable future.

(2) Recreational Activities

Recreational activities (*e.g.,* mountain bikes and motorized bikes) and OHV use can impact *Penstemon flowersii* and its habitat. The OHV use was documented within three element occurrences of *P. flowersii* to varying degrees (UNHP 2010b, entire). Two of these sites were listed in marginal condition, although plant vigor and reproduction at these sites was good (UNHP 2010b, entire). Disturbance occurred at a third site in 1995, and a population decline for this site was attributed to OHV activity (Heil and Melton 1995b, p. 17). However, vigorous plants were observed at this site with ample flower production (UNHP 2010b, entire; Brunson 2010b, p. 1). The OHV use was not documented for the five remaining element occurrences or in the new *P. flowersii* site, but this does not necessarily mean OHV use does not occur there. Additionally, no other recreational uses were documented at *P. flowersii* sites.

In summary, OHV use may be negatively affecting individual plants at some sites, but this impact is localized and not rangewide. We identified OHV use in the species' habitat, but the plants are vigorous and retaining their ability to reproduce. Therefore, we believe that recreational activities are not threats to *Penstemon flowersii* now or for the foreseeable future.

(3) Oil and Gas Exploration and Development

Oil and gas exploration and development can impact *Penstemon flowersii* plants and their habitat (BLM 2008c, pp. 448–449). Within all mapped element occurrences of *P. flowersii,* there are four plugged and abandoned wells. All existing wells were plugged prior to 1999. As mentioned previously, plugged and abandoned wells involve surface disturbance for roads and well pads when they are constructed and during operation, but when they are abandoned they are reclaimed and do not receive regular traffic or disturbance (*see Astragalus hamiltonii,* Factor A, Oil and Gas Exploration and Development). There are two new proposed well locations within the species' mapped element occurrences—one well location that has an approved permit to drill and one well location that is not yet approved. Approved permits allow for well drilling, which will have associated negative impacts to vegetation, and potentially *P. flowersii,* during construction and drilling operations. These impacts have historically been localized and small in scale. We expect these impacts to continue to be minimal, considering that oil and gas development has occurred only minimally in *P. flowersii* habitat.

The lack of oil and gas development in *Penstemon flowersii* habitat is most likely because there is not enough product to be economically feasible with current technology (Doyle 2010, pers. comm.; Sparger 2010, pers. comm.) rendering dense energy developments unlikely in this area (BLM 2008c, p. 486). Although oil and gas development could potentially expand throughout *P. flowersii* habitat, substantial development is not likely for the next 20 years (BLM 2008c, p. 486), nor is it likely to occur across the entire range of *P. flowersii.* Thus, oil and gas exploration and development is not a threat to *P. flowersii* now or in the foreseeable future.

(4) Nonnative Invasive Species

We have limited information regarding the distribution of nonnative invasive species in *Penstemon flowersii* habitat. We know that invasive species, particularly *Bromus tectorum,* occur within *P. flowersii* habitat (Frates 2010, pp. 29–30). However, we do not have any information indicating that *B. tectorum* or other nonnative invasive species impact *P. flowersii.*

Soil disturbances can increase invasive species (*see Astragalus hamiltonii,* Factor A, Nonnative Invasive Species) (Evans *et al.* 2001, p. 1308). As noted above, *B. tectorum,* a major invasive plant species in the West, invades areas in response to surface disturbances (Hobbs 1989, pp. 389, 393, 395, 398; Rejmanek 1989, pp. 381–383; Hobbs and Huenneke 1992, pp. 324–325, 329, 330; Evans *et al.* 2001, p. 1308). Therefore, we assessed the potential for soil disturbances to increase nonnative invasive species in the foreseeable future in *Penstemon flowersii* habitat.

Agricultural use, livestock grazing, and oil and gas exploration and development are the predominant activities that disturb soils across the range of *Penstemon flowersii.* We determined that these activities are not extensive enough to threaten *P. flowersii* now or in the foreseeable future (*see* Agricultural Use/Livestock Grazing and Oil and Gas Exploration and Development). Thus, we also do not expect that these activities will increase surface disturbance to the point where invasive species will become established and impact *P. flowersii* to a significant degree. At this time, we have no information suggesting that nonnative invasive species are a threat to *P. flowersii* now or for the foreseeable future.

(5) Rural Residential Development

Conversion of land for rural residential development can result in the permanent loss and fragmentation of habitat for many species, including *Penstemon flowersii.* Impacts include, but are not limited to, crushed vegetation, compacted soils, introduced exotic plant species, reduced available habitat, and increased habitat fragmentation (Hansen *et al.* 2005, entire). For the purpose of this analysis, we define rural residential development as the expansion of rural towns and surrounding rural areas through low-density housing construction and related business and industrial development.

Duchesne and Uintah Counties, where *Penstemon flowersii* is found, had the highest (3.6 percent) and fourth highest (1.8 percent) population growth rates in Utah from 2008 to 2009, respectively (Utah Population Estimates Committee 2009, p. 2). The average population increase across the state of Utah was 1.5 percent over the same timeframe (Utah Population Estimates Committee 2009, p. 4). Roosevelt is the largest municipality that occurs near known *P. flowersii* habitat, and two smaller municipalities, Ballard and Myton, are nearby. The U.S. Census Bureau estimates that the population of Roosevelt increased approximately 12 percent from 2000 to 2009, with Ballard and Myton increasing 34 and 17 percent, respectively (U.S. Census Bureau 2010a, entire). Human population growth can destroy and fragment habitat as municipalities grow and incorporate more of what was once natural land.

Over the next 50 years, Duchesne and Uintah Counties are projected to grow at a slower rate of 1.1 percent (Utah Governor's Office of Planning and Budget (Utah GOPB) 2008, entire). At this growth rate, Daggett, Duchesne, and Uintah Counties (which are grouped together by the Utah Population Estimates Committee) are expected to increase from a current total population of 49,707 to 80,319 by 2060 (Utah GOPB 2008, entire). The City of Roosevelt projects a population of 6,600 by 2030, but they anticipate the population could be higher (City of Roosevelt 2010, p. 7). Much of the urban and rural development in the Uinta Basin is influenced by the boom and bust cycles of energy development, and another boom cycle could increase population growth over predictions.

Although municipalities are growing and are projected to increase near *Penstemon flowersii* habitat, they are not likely to impact a substantial amount of the known habitat of this species. The southern edge of Roosevelt's municipal boundary is approximately 0.2 mi (0.3 km) north of the northern boundary of element occurrence 1 (see Figure 2). The city limits of Ballard and Myton are immediately adjacent to element occurrences 1 and 9, with Ballard city limits overlapping element occurrence 6. None of these municipalities overlap with known sites of *P. flowersii.* Roosevelt will likely expand into an area already defined as an annexation area (City of Roosevelt 2010, p. 42), and this area is approximately 2 mi (3.2 km) north of element occurrence 9 and the new site of *P. flowersii* on private land. Roosevelt and Ballard city limits are constrained by geography and Tribal boundaries, and neither are likely to expand substantially southward toward known *P. flowersii* sites (Eschler 2010, pers. comm.; Hyde 2010, pers. comm.).

In summary, rural residential development is occurring now and is likely to increase in the future, but most of this development would occur outside of *Penstemon flowersii* known sites. Therefore, we do not believe rural residential development is a significant threat to the species now or in the foreseeable future.

Summary of Factor A

Based on the best available information, we do not believe that conversion to agricultural use/livestock grazing, recreational activities, nonnative invasive species, oil and gas exploration and development, or rural residential development threaten *Penstemon flowersii* now or in the foreseeable future. Conversion to agricultural use most likely had an appreciable negative impact on *P. flowersii* historically, but we have no evidence that conversion to agricultural use continues today at a level that threatens the species. Likewise, livestock grazing is not widely noted across *P. flowersii* sites, and where it occurs it does not appear to negatively impact individuals. The OHV use, the only documented recreational activity in *P. flowersii's* habitat, is localized, and we do not have evidence that *P. flowersii* is considerably compromised or threatened by OHV use. We do not have information to support that nonnative invasive species are currently threatening *P. flowersii* or will be likely to do so in the foreseeable future. It is unlikely that current technologies and economic conditions will support substantial oil and gas development across *P. flowersii* habitat in the foreseeable future. Finally, rural residential development is unlikely to expand substantially into *P. flowersii* habitat. We find that the present or threatened destruction, modification, or curtailment of its habitat or range is not a threat to *P. flowersii* now or for the foreseeable future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of threats from overutilization or collection of *Penstemon flowersii* for commercial, recreational, scientific, or educational purposes, nor do we expect overutilization in the foreseeable future. *P. duchesnensis,* which is geographically near *P. flowersii,* is used horticulturally (Frates 2010, p. 75). However, *P. flowersii* is more obscure, and we have no evidence that this species is sought out for horticultural purposes (Frates 2010, p. 75). Therefore, we do not consider overutilization a threat to *P. flowersii* now or in the foreseeable future.

Factor C. Disease or Predation

Disease and herbivory by insects, wildlife, or livestock was documented for *Penstemon flowersii* on only one occasion: Caterpillars were feeding on *P. flowersii* plants near Midview Reservoir (Spencer 2010b, pers. comm.). We do not know how widespread this herbivory was or if it had detrimental effects on *P. flowersii;* caterpillars naturally feed on many plant species. The UNHP data did not note disease or herbivory for the species (UNHP 2010b, entire). With no data indicating otherwise, we do not consider disease or predation to be a threat to *P. flowersii* now or in the foreseeable future.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

There are no Federal or State laws that protect Penstemon flowersii. P. flowersii is found mostly on non-Federal lands, where no known regulatory mechanisms exist. However, we found that there are no threats to the species that warrant additional regulatory mechanisms (*see* Factors A, B, C, and E). Therefore, we do not consider the inadequacy of existing regulatory mechanisms as a threat to this species now or in the foreseeable future.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Natural and manmade threats to *Penstemon flowersii's* survival include: (1) Small population size and (2) climate change and drought.

(1) Small Population Size

Penstemon flowersii grows across an area of 80 mi² (*207 km²*). P. flowersii individuals occur in well-defined populations that are geographically isolated from one another. Thus, this species may be prone to the negative effects of small population size, in part because historical fragmentation of habitat (*e.g.,* agricultural use) may have resulted in small populations with limited gene flow. *P. flowersii* also appears to have episodic growth patterns with large fluctuations in numbers from year to year (Franklin 2005, p. 131; 2010, p. 79). This fluctuation and patchy distribution may make *P. flowersii* more vulnerable to the impacts of small population size, limiting its ability to survive periods of low growth or recruitment.

The species' biology, distribution, and even our information gaps indicate that small population sizes may not significantly impact *Penstemon flowersii*. For example, *P. flowersii* grows vigorously and in moderate densities with evidence of good reproduction and recruitment (UNHP 2010b, entire; Brunson 2010b, p. 1). Although we still consider *P. flowersii* a narrow endemic, it occurs across a relatively large range. In addition, there are relatively large amounts of unsurveyed potential habitat between known sites that could result in an expanded species distribution and range.

Finally, we have not identified other surface-disturbing threats to this species that would cumulatively increase the risk of small population size. As previously discussed under Factor E for *Astragalus hamiltonii* (above), with no threats linked to a species' rarity, we do not consider rarity alone to be a threat. A species that has always been rare, yet continues to survive, could be well equipped to continue to exist into the future. Many naturally rare species have persisted for long periods within small geographic areas, and many naturally rare species exhibit traits that allow them to persist despite their small population sizes. Consequently, the fact that a species is rare does not necessarily indicate that it may be in danger of extinction in the foreseeable future. Thus, we believe that small population size is not a threat to *P. flowersii.*

(2) Climate Change and Drought

Potential impacts of climate change and drought to the geographic area are characterized in the Climate Change and Drought section under Factor E for *Astragalus hamiltonii* (above). *Penstemon flowersii* occurs within the same geographic vicinity as A. hamiltonii and, therefore, will be exposed to similar changes in climate and drought.

No trend data are available for *Penstemon flowersii* that would elucidate the relationship between the species' stability and climate variables. We do not know what causes fluctuations in *P. flowersii* abundance, but if it is due to environmental factors like precipitation or temperature, climate change could negatively affect this species. However, because of the lack of available data, any predictions are speculative.

We expect that *Penstemon flowersii,* like other narrow endemics, may be negatively affected by climate change and drought. However, despite climate changes that have occurred over the past 30 years, we have no evidence that *P. flowersii* populations are declining, and we have no basis to predict how this species will respond in the future to climate change. Over the past 30 years, plant health remains normal to vigorous, and reproduction and recruitment continue to occur at some *P. flowersii* element occurrences (UNHP 2010b, entire). We have not identified other threats to this species, such as mining, that would cumulatively exacerbate the threat of climate change. Based upon the best available information, we do not believe that climate change is a threat now or is likely to become one in the foreseeable future.

Summary of Factor E

We assessed the potential risks of small population size, climate change, and drought to *Penstemon flowersii*. There is no evidence that the species' small population size is a threat to *P. flowersii*. The species is adapted to a landscape where drought naturally occurs, and we have no information indicating that the species is threatened by climate change. In addition, as described in Factor A, there are no threats to the species that would result in significant loss or fragmentation of available habitat, and thus there are no cumulative effects to exacerbate the threat of climate change or small population sizes. Therefore, based on the best scientific and commercial information available at this time, we conclude that natural or manmade factors are not threats to *P. flowersii* now or for the foreseeable future.

Finding

As required by the ESA, we conducted a review of the status of the species and considered the five factors in assessing whether *Penstemon flowersii* is endangered or threatened throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by *P. flowersii.* We reviewed the petition, information available in our files, other available published and unpublished information, and we consulted with recognized *P. flowersii* experts and other Federal, State, and Tribal agencies.

The factor with potentially the most impact on *Penstemon flowersii* was historical agricultural development. Site visits show plants persist in pasture lands (Holmgren 2009 pers. comm. in Frates 2010, p. 35; Brunson 2010b, p. 1), and we have little evidence that conversion to agricultural use is an ongoing threat to this species. Livestock do not appear to forage on *P. flowersii,* and the species occurs in grazing pastures. Rural residential development is another factor that could potentially destroy and fragment this species and its habitat in the future, but it is unlikely to occur at a high level across *P. flowersii's* known range. Other factors affecting *P. flowersii*—including recreational activities, nonnative invasive species, oil and gas development, and small population size—are either limited in scope, or we do not have evidence that supports these factors adversely impacting the species as a whole. We have no evidence that overutilization, disease, and predation are affecting this species. Although climate change will likely impact the species, we do not have any information that indicates it threatens the continued existence of *P. flowersii.* Finally, because none of these factors rises to the level of a threat that would warrant additional regulatory mechanisms, the inadequacy of regulatory mechanisms does not negatively affect *P. flowersii*.

Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the factors analyzed above are not of sufficient imminence, intensity, or magnitude to indicate that *Penstemon flowersii* is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened) throughout all or a significant portion of its range. Therefore, we find that listing *P. flowersii* as threatened or endangered species is not warranted throughout its range.

Significant Portion of the Range

Having determined that *Penstemon flowersii* does not meet the definition of threatened or endangered species, we must next consider whether there are any significant portions of the range where *P. flowersii* is in danger of extinction or are likely to become endangered in the foreseeable future. *See* the *Significant Portion of the Range* section under *Astragalus hamiltonii* (above) for a summary of our interpretation of the meaning of "in danger of extinction throughout all or a significant portion of its range."

We have no evidence that any particular population or portion of the range of *Penstemon flowersii* is critical to the species' survival. Because our understanding of the species' distribution is incomplete and population counts fluctuate widely, we cannot determine that any one element occurrence is more critical to the species' survival (i.e., has a significant portion of individuals) than another. Additionally, potential threats to the species appear to be uniform throughout *P. flowersii's* range. Therefore, we do not find that *P. flowersii* is in danger of extinction now, nor is it likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Therefore, listing *P. flowersii* as threatened or endangered under the ESA is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, *Penstemon flowersii* to our Utah Ecological Services Field Office (*see* **ADDRESSES** section) whenever such information becomes available. New information will help us monitor *P. flowersii* and encourage its conservation. If an emergency situation develops for *P. flowersii,* or any other species, we will act to provide immediate protection.

Species Information—Eriogonum soredium and Lepidium ostleri

Eriogonum soredium and *Lepidium ostleri* occur in the same habitat and have the same distribution. Therefore, we discuss these species together for purposes of this finding.

Taxonomy and Species Description

Eriogonum soredium

Eriogonum soredium is a low mound-forming perennial plant in the buckwheat family (Polygonaceae) that is 0.8 to 1.6 in (2 to 4 cm) tall and 3.9 to 19.7 in (10 to 50 cm) across (Welsh *et al.* 2008, p. 588). The leaves are 0.08 to 0.2 in (2 to 5 mm) long, 0.03 to 0.08 in (0.7 to 2 mm) wide, round to oval, and covered on both surfaces by short, white, wooly hairs (Welsh *et al.* 2008, p. 588). The numerous flowers are arranged in tight clusters resembling drumsticks. Individual flowers are white or partially pink and 0.08 to 0.12 in (2 to 3 mm) long (Welsh *et al.* 2008, p. 588). Flowering generally occurs from June to August. The seeds, which are 0.08 to 0.10 in (2 to 2.5 mm) long, mature from July through September (Welsh *et al.* 2008, p. 588).

Eriogonum soredium was first described in 1981 by James Reveal based on a collection by Stan Welsh and Matt Chatterly (Reveal 1981, entire; Kass 1992a, p. 1). *E. soredium* has not undergone any taxonomic revisions since it was originally described. Therefore, we accept the current taxonomy as an indication that the species constitutes a listable entity under the ESA.

Lepidium ostleri

Lepidium ostleri is a long-lived perennial herb in the mustard family (Brassicaceae). It grows in dense cushion-like tufts up to 2 in (5 cm) tall (Welsh *et al.* 2008, p. 328). The grayish-green hairy leaves are 0.16 to 0.59 in (4 to 15 mm) long, generally linear, and entire or with lobed basal leaves (Welsh *et al.* 2008, p. 328). Flowering stalks are approximately 0.39 in (1 cm) long with 5 to 35 flowers that are white or have a purple tint (Welsh *et al.* 2008, p. 328). Flowering generally occurs from June to early July, followed by fruit set from July to August (Welsh *et al.* 2008, p. 328).

Lepidium ostleri was first described in 1980 by Stan Welsh and Sherel Goodrich based on a collection by Stan Welsh and Matt Chatterly (Welsh and Goodrich 1980, entire; Kass 1992b, p. 1). *L. ostleri* has not undergone any taxonomic revisions since it was originally described. We are accepting the current taxonomy and consider *L. ostleri* a listable entity under the ESA.

Distribution and Population Status

Eriogonum soredium and *Lepidium ostleri* are each known from four distinct, overlapping populations on private lands in the southern San Francisco Mountains in Beaver County, Utah—the Grampian Hill, Cupric Mine, Copper Gulch, and Indian Queen populations (Figure 3; Miller 2010g, p. 6; Roth 2010a, pp. 1–2). We are not aware of any additional populations. Surveys were conducted on BLM lands adjacent to the known populations in 2010, and no plants or habitat were found (Miller 2010g, Appendix B and p. 6; Roth 2010a, pp. 1–3); these adjacent areas do not contain Ordovician Limestone, the substrate that supports both *E. soredium* and *L. ostleri* (*see* Habitat section below) (Miller 2010g, p. 6). Similarly, no additional populations of either species were found during surveys of the San Francisco Mountains and surrounding ranges (including the Wah Wah Mountains, Crystal Peak, the Confusion Range, and the Mountain Home Range) (Kass 1992a, p. 5; Kass 1992b, p. 4; Evenden 1998, p. 5; Robinson 2004, p. 16; Miller 2010c, entire; Roth 2010a, pp. 2–3).

There were reports of two populations of *E. soredium* in the Wah Wah Mountains; however, we do not believe these reports are accurate—one report appears to have incorrect location information (Kass 1992a, p. 5; Franklin 2005, p. 85) and the other report appears to be a species misidentification (Robinson 2004, p. 16; Roth 2010a, p. 3). Therefore, reports of these two populations are thought to be erroneous and are not discussed further in this finding.

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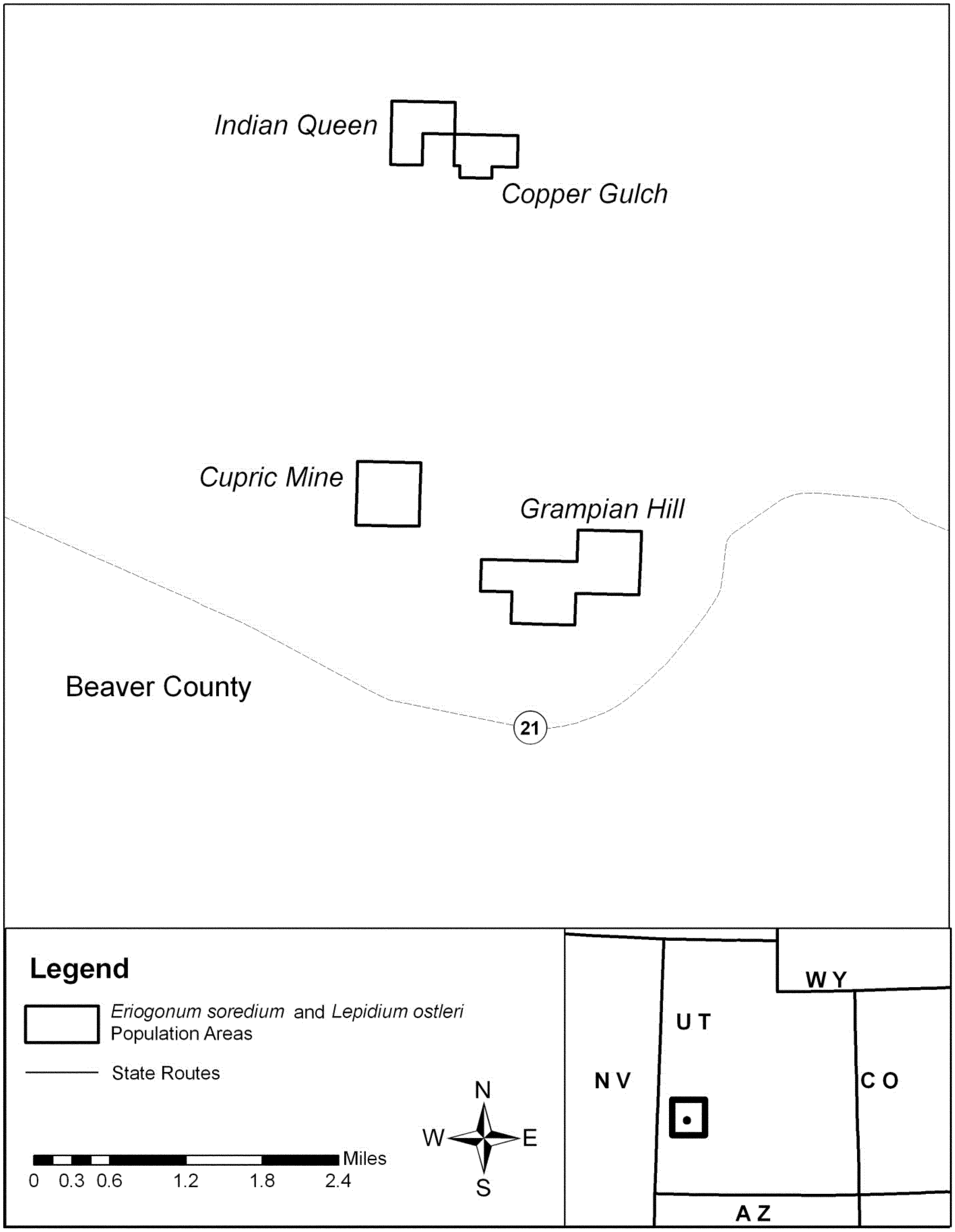

Figure 3. *Eriogonum soredium* and *Lepidium ostleri* range.

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Eriogonum soredium and *Lepidium ostleri* are distributed across a total range of less than 5 mi ^{2} (13 km ^{2}). Previous estimates of the species' total occupied habitat ranged from 170 acres (ac) (69 hectares (ha)) (Evenden 1998, Appendix C) to 400 ac (160 ha) (Kass 1992a, pp. 7–8; 1992b, p. 7). However, we now have more accurate global positioning system information that shows the two species' total occupied habitat is approximately 52 ac (21 ha) (based on Miller 2010g, Appendix B). For both species, each of the four known populations are estimated to occupy habitat ranging between 5 ac (2 ha) and 29 ac (12 ha), with localized high densities of plants (Evenden 1989, Appendix C; Miller 2010g, Appendix B).

All known *Eriogonum soredium* and *Lepidium ostleri* populations are located on private lands (Miller 2010g, p. 6; Roth 2010a, pp. 1–2). Their occurrence on these private lands hinders our ability to collect accurate long-term population count or trend information because of access limitations. The populations were visited sporadically over the last couple of decades; however, we have no information on sampling methods used by individual surveyors. Common field techniques used to estimate population size tend to be highly subjective in the absence of actual population counts. Population estimates also may be skewed by how the species grow. Both species grow in low, mound-forming clusters, making it difficult to distinguish individual plants—some observers may assume each cluster is one plant and other observers might apply a multiplier to each cluster to count them as multiple plants; therefore, using either of these methods would greatly skew the resulting population estimate. We believe these biases help explain the seemingly large fluctuations in numbers of plants observed during different surveys (*see* below); *E. soredium* and *L. ostleri* are robust, long-lived perennial plants that are unlikely to exhibit such extreme population fluctuations (Garcia *et al.* 2008, pp. 260–261).

Accordingly, the available population estimates are highly variable and probably not accurate. For *Eriogonum soredium,* available population estimates range from a low of 10 to 100 plants in 2004 to a high of 76,000 to 81,000 individuals in 2010 (Kass 1992a, p. 8; Evenden 1998, Appendix C; Robinson 2004, pp. 11–15; Miller 2010a, pers. comm.; Miller 2010b, pers. comm.; Miller 2010c, pp. 2–5; Roth 2010a, p. 4). For *Lepidium ostleri,* available population estimates range from a total of 700 individuals (Kass 1992b, p. 8) to approximately 17,000 individuals in the 1990s (Evenden 1998, Appendix C). Currently, the total number of *L. ostleri* plants is estimated at approximately 43,000 (Miller 2010a, pers. comm.; Miller 2010c, pp. 2–5; Roth 2010a, p. 4). However, due to the aforementioned survey inaccuracies, we are not able to determine accurate population estimates or trends for either species. In 2010, both species were documented at all four known populations (Miller 2010g, entire).

We lack demographic information, which is measured by studying the size, distribution, composition, and changes within a specified population over time.

Habitat

Eriogonum soredium and *Lepidium ostleri* are narrow endemics restricted to soils derived from Ordovician limestone outcrops (Evenden 1998, p. 5). There are approximately 845 ac (342 ha) of Ordovician limestone outcrops in the San Francisco Mountains (Miller 2010g, Appendix F). In addition, there are 719 ac (291 ha) of Cambrian dolomite substrates in the San Francisco Mountains; there is the potential for small "islands" of Ordovician limestone outcrops to occur within these substrates (Miller 2010g, Appendix F, p. 7).

Ordovician limestone is rare within a 50-mi (80-km) radius of the San Francisco Mountains (Miller 2010g, Appendix F). Cambrian dolomite substrates are present in the Wah Wah Mountains to the west of the San Francisco Mountains (Miller 2010g, Appendix F). However, as previously described (see Distribution and Population Status), there is no indication that additional populations of either species occur in these areas.

We do not know if there are other limiting factors associated with the limestone formations that restrict the habitat use and distribution of these species—these species occupy only a fraction of the available habitat and are known to occur on only 52 ac (21 ha), or just 6 percent, of the available Ordovician limestone outcrops.

Eriogonum soredium and *Lepidium ostleri* are associated with pinion-juniper and sagebrush communities between 6,200 and 7,228 ft (1,890 and 2,203 m) in elevation. They are typically found on sparsely vegetated exposed slopes with *Ephedra* sp. (Mormon tea), *Gutierrezia sarothrae* (snakeweed), *Cercocarpus intricatus* (dwarf mountain-mahogany), and *Petradoria pumila* (rock goldenrod). Associated rare species include *Trifolium friscanum.*

Life History

We do not have a clear understanding of the reproductive biology or life history of *Eriogonum soredium,* but recruitment appears to be low or perhaps episodic (Kass 1992a, p. 7; Roth 2010a, p. 1). Juvenile plants and seedlings have been observed in only two of the four populations (Miller 2010g, p. 4). In 2010, dead or partially dead plants were found throughout all populations, but we have no information on the cause of death or the approximate number of dead plants (Miller 2010g, p. 4).

No information is available on the life history of *Lepidium ostleri.*

Summary of Information Pertaining to the Five Factors—*Eriogonum soredium* and *Lepidium ostleri*

In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information pertaining to *Eriogonum soredium* and *Lepidium ostleri* in relation to the five factors provided in section 4(a)(1) of the ESA (*see* the full description of these five factors in the Summary of Information Pertaining to the Five Factors—*Astragalus hamiltonii,* above). *E. soredium* and *L. ostleri* co-occur in the same habitat and, therefore, are addressed together in the Five Factor Analysis below.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Their Habitat or Range

The following factors may affect the habitat or range of *Eriogonum soredium* and *Lepidium ostleri:* (1) Livestock grazing, (2) recreational activities, (3) mining, and (4) nonnative invasive species.

(1) Livestock Grazing

Potential impacts of livestock grazing to plants are discussed above in the Livestock Grazing section under Factor A for *Astragalus hamiltonii.* As previously stated, all populations of *Eriogonum soredium* and *Lepidium ostleri* occur on private lands.

We have no information on livestock grazing management on private lands, but adjacent BLM lands belong to active grazing allotments (Galbraith 2010, pers. comm.). Adjacent private lands are subject to the same grazing practices as the allotted BLM land if they are not fenced (Galbraith 2010, pers. comm.). Private lands in the San Francisco Mountains are only partially fenced; hence, livestock may have access to areas where *E. soredium* and *L. ostleri* occur. However, impacts to *E. soredium* or *L. ostleri* from livestock grazing have not been documented (Kass 1992a and 1992b, entire; Evenden 1998, entire; Miller 2010g, p. 5; Roth 2010a, p. 1).

Based on our review of the available information, there is no indication that grazing impacts the species now or will impact the species in the foreseeable future at a level that threatens *E. soredium* or *L. ostleri.*

(2) Recreational Activities

Potential impacts of recreational activities to plants are discussed above in the Recreational Activities section under Factor A for *Astragalus hamiltonii.* There are no known impacts of OHV use in *Eriogonum soredium* and *Lepidium ostleri* occupied habitats (Miller 2010f, pers. comm.; Roth 2010a, pp. 1–2). Access to the majority of the occupied habitat, which occurs on private lands, is posted as closed to all vehicles, including OHVs (Miller 2010g, p. 5). The OHV use does not appear to impact adjacent BLM lands in the San Francisco Mountains (Pontarolo 2009, pers. comm.). Therefore, we have no information indicating that recreational activities threaten *E. soredium* and *L. ostleri* now nor do we anticipate these activities will become a threat in the foreseeable future.

(3) Mining

Mining activities occurred historically throughout the range of *Eriogonum soredium* and *Lepidium ostleri* and continue to impact these species. Mining activities can impact *E. soredium* and *L. ostleri* by removing habitat substrate, increasing erosion potential, fragmenting habitat through access road construction, degrading suitable habitat, and increasing invasive plant species (Brock and Green 2003, p. 15; BLM 2008c, pp. 448–449). Impacts to *E. soredium* and *L. ostleri* individuals include crushing and removing plants, reducing plant vigor, and reducing reproductive potential through increased dust deposits, reduced seedbank quantity and quality, and decreased pollinator availability and habitat (Brock and Green 2003, p. 15; BLM 2008c, pp. 448–449).

The San Francisco Mountains have an extensive history of precious metal mining activity (Evenden 1998, p. 3). All four of the known populations and much of the species' potential habitat were impacted by precious metal mining activities in the past, as evidenced by a high density of mine shafts, tailings, and old mining roads throughout the habitat of *Eriogonum soredium* and *Lepidium ostleri* (Table 3; Kass 1992a, p. 10; Evenden 1998, p. 3; Roth 2010a, p. 2).

The eastern part of the Grampian Hill population surrounds old mine shafts associated with the King David Mine, which is part of the historical Horn Silver Mine. The Horn Silver Mine was one of the largest silver mines in the country until it collapsed in 1885 (Murphy 1996, p. 1; Evenden 1998, p. 3). The Cupric Mine population is located immediately above a mine shaft associated with the Cupric Mine, a historical copper mine. Old mine shafts are located within 0.3 mi (0.5 km) of the Copper Gulch population; these mine shafts are associated with the Cactus Mine, also a historical copper mine. Two mine shafts are located within the Indian Queen population and three additional mine shafts are located immediately adjacent to this population. These mine shafts also are part of the historical Cactus Mine.

TABLE 3—MINING ACTIVITIES IN THE HABITAT OF *Eriogonum Soredium* AND *Lepidium Ostleri*

Population	Mining activity		
	Historical	Current	Future
Grampian Hill	silver, lead, copper, zinc (Horn Silver Mine)	None	silver, lead, copper, zinc, landscape gravel quarrying.
Cupric Mine	silver, lead, copper, zinc, gravel quarrying (Cupric Mine).	gravel quarrying	silver, lead, copper, zinc, landscape gravel quarrying.
Copper Gulch	silver, lead, copper, zinc, gravel quarrying (Cactus Mine).	gravel quarrying	silver, lead, copper, zinc, landscape gravel quarrying.
Indian Queen	silver, lead, copper, zinc, gravel quarrying (Cactus Mine).	gravel quarrying	silver, lead, copper, landscape gravel quarrying.

Large-scale precious metal mining ceased decades ago. However, all precious metal mining claims in the southern San Francisco Mountains are patented (a claim for which the Federal Government has passed its title to the claimant, making it private land) and continued occasional explorations for silver, zinc, and copper deposits are reported for the area (Bon and Gloyn 1998, p. 12; Franconia Minerals Corporation 2002, p. 1; Rupke 2010, pers. comm.). In fact, in 1998 this area was one of the most active precious metal exploration areas in the State (Bon and Gloyn 1998, pp. 11–12). In addition, exploration activities were reinitiated at the Horn Silver Mine in 2002, confirming that extensive amounts of sphalerite (the major ore of zinc) remain in the mine (Franconia Minerals Corporation 2002, p. 1).

We expect the demand for silver and copper to increase in the future (Crigger 2010, pp. 1–2; Murdoch 2010, pp. 1–2). The price for silver nearly tripled over the last decade (Stoker 2010, p. 2). The market for silver is expected to grow in the future due to its high demand for industrial uses in solar panel construction, wood preservatives, and medical supplies (Ash 2010, p. 1). Since 2009, the value of copper increased more than 140 percent (Crigger 2010, pp. 1–2; Murdoch 2010, pp. 1–2). The market for copper, one of the world's most widely used industrial metals, is expected to increase in the future due to demand for electrical wiring, plumbing, and car fabrication (Crigger 2010, pp. 1–2; Murdoch 2010, pp. 1–2). In Utah, precious metals accounted for approximately 14 percent of the total value of minerals produced in 2009 (up from 8 percent in 2008) (Utah GOPB 2010, pp. 195–196). Utah's precious metal gross production value increased $221 million (57 percent) compared to 2008, due to increased production of both gold and silver (Utah GOPB 2010, p. 196). Because the San Francisco Mountains area was one of the most productive areas during the last large-scale precious metal mining efforts, it is reasonable to assume that it will become important again, particularly given the ongoing exploration activities at the mines.

As previously described, *Eriogonum soredium* and *Lepidium ostleri* are endemic to soils derived from Ordovician limestone. In addition to precious metals, this formation is mined for crushed limestone. The limestone is removed from quarry sites and sold for marble landscaping gravel.

Marble landscaping gravel quarries in *Eriogonum soredium* and *Lepidium ostleri's* range are open-pit mines that result in the removal of the habitat substrate for these species. Four active limestone quarry sites occur within a couple hundred feet of three of the species' populations—Cupric Mine, Copper Gulch, and Indian Queen populations (Table 3).

A limestone quarry is considered active from the time quarrying begins until the site is reclaimed. Generally, gravel pits are maintained below 5 ac (2 ha) of surface disturbance to avoid large mine status, which requires permitting (Munson 2010, pers. comm.). Hence, an area may contain many quarries at or below the 5-ac (2-ha) threshold, all of which may be considered active (Munson 2010, pers. comm.). A mine also may stay below 5 ac (2 ha) as long as previously disturbed areas at the quarry site are reclaimed prior to expanding quarrying operations (Munson 2010, pers. comm.). The Cupric Mine, Copper Gulch, and Indian Queen populations of *Eriogonum soredium* and *Lepidium ostleri* all have small individual gravel pits—resulting in a lack of environmental analyses and potential mitigation opportunities (*see* Factor D, *Inadequacy of Existing Regulatory Mechanisms*).

As stated in the Distribution and Population Status section above, *Eriogonum soredium* and *Lepidium ostleri* occur in the same overlapping locations, each occupying a total of 52 ac (21 ha) in four populations. We estimate the quarries at the three population sites (Cupric Mine, Copper Gulch, and Indian Queen) historically resulted in the loss of 26 ac (11 ha) of suitable habitat adjacent to currently known plant locations (Table 4; Darnall *et al.* 2010, entire). Based on habitat similarities and proximity, it is likely that the plant occupied the entire 26 ac (11 ha) that are now being quarried. There are 23 ac (9 ha) of remaining occupied habitat in the three populations (Table 4; Darnall *et al.* 2010, entire), but these areas are at risk of being impacted by the gravel pits. The only population not impacted by gravel pits—the Grampian Hill population—is 29 ac (12 ha) in size. Even so, the Grampian Hill population is only 1 mi (1.6 km) away from the nearest gravel pit and, as previously discussed, it is impacted by precious metal mining.

TABLE 4—AREAS OF SURFACE DISTURBANCE ASSOCIATED WITH GRAVEL MINING IN THE VICINITY OF *Eriogonum Soredium* AND *Lepidium Ostleri* POPULATIONS

Population	Occupied area	Adjacent surface disturbance
Indian Queen	9 ac (3.6 ha)	14 ac (5.7 ha).
Copper Gulch	5 ac (2.0 ha)	5 ac (2.0 ha).
Cupric Mine	9 ac (3.6 ha)	7 ac (2.8 ha).
Total	23 ac (9.2 ha)	26 ac (10.5 ha).

Quarrying is occurring in the immediate vicinity of the Cupric Mine population (Evenden 1998, p. 5; Robinson 2004, p. 8; Frates 2006, pers. comm.; Roth 2010a, p. 2; Miller 2010e, pers. comm.; Munson 2010, pers. comm.); we anticipate this mining activity will continue to impact this population in the near future (Roth 2010a, p. 2). The estimated area of occupied habitat of the Cupric Mine population in the vicinity of this gravel pit is 9 ac (4 ha) (Table 4; Darnall *et al.* 2010, entire), while gravel mining has resulted in surface disturbance of approximately 7 ac (3 ha) (Table 4; Darnall *et al.* 2010, entire). No quarrying activity was observed in the vicinity of the Copper Gulch and Indian Queen populations in 2010; however, the gravel pits are still considered active and thus additional gravel mining could occur at any time. For both of these populations (Copper Gulch and Indian Queen), adjacent surface disturbance is equal to or greater than the remaining occupied habitat (Table 4; Darnall *et al.* 2010, entire).

It is important to note that all of the active quarries are near or above the 5-ac (2-ha) regulatory limit. Thus, we anticipate that the operators will file for large mine permits, partially restore the disturbed areas to be below the 5-ac (2-ha) limit, or will begin new gravel pits (Munson 2010, pers. comm.). Under any of these scenarios, it is likely that occupied habitats of *Eriogonum soredium* and *Lepidium ostleri* will be impacted, particularly given the ongoing need for limestone gravel in nearby communities, as described below.

Between 1995 and 2001, the production of building and landscaping stones in Utah jumped nearly 700 percent (Stark 2008, p. 1). Construction sand, gravel, and crushed stone production rank as the second most valuable commodity produced among industrial minerals in Utah (Bon and Krahulec 2009, p. 5). The use of landscape gravel will likely continue to increase in nearby Washington County, which is one of the fastest growing counties in the United States and Utah (U.S. Census Bureau 2010b, entire; Utah GOPB 2010, p. 48). The Washington County population has doubled every 10 years since 1970. In 2009, there were 145,466 people estimated to live in Washington County (Utah GOPB 2010, p. 49). Over 700,000 people are expected to live in Washington County by 2050 (Utah GOPB 2008, entire). Based on the projected population growth for Washington County, we believe that the regional demand for landscape gravel will continue to increase in southwestern Utah in the foreseeable future.

Much of the rock quarried in Utah does not travel far because of the associated high cost of transport (Stark 2008, p. 1). The quarries of the southern San Francisco Mountains are the closest quarries providing crushed limestone for southwestern Utah, including Washington County (Mine Safety and Health Administration 2010, p. 1). In addition to regional distribution, crushed limestone quarried from the vicinity of the Copper Gulch, Indian Queen, and Cupric Mine populations is transported to a distribution center for the Home Depot in the nearby town of Milford, where it is packaged and shipped nationwide (Munson 2010, pers. comm.).

To summarize, mining throughout *Eriogonum soredium* and *Lepidium ostleri's* range reduced available habitat and impacted the species' populations in the past (Table 3; Table 4). All four populations of *Eriogonum soredium* and *Lepidium ostleri* co-occur with precious metal mining activities. For both species, three of the four populations—the Cupric Mine, Copper Gulch, and Indian Queen populations—co-occur with active gravel mining pits.

Available information suggests that all populations are likely to be impacted by precious metal and gravel mining in the foreseeable future based on mineral availability and market projections. Therefore, we have determined that mining is a threat to *E. soredium* and *L. ostleri* now and in the foreseeable future.

(4) Nonnative Invasive Species

Potential impacts of nonnative invasive species to native plants and their habitat are discussed above in the Nonnative Invasive Species section under Factor A for *Astragalus hamiltonii*. *Bromus tectorum* is considered the most ubiquitous invasive species in the Intermountain West due to its ability to rapidly invade native dryland ecosystems and outcompete native species (Mack 1981, p. 145; Mack and Pyke, 1983, p. 88; Thill *et al.* 1984, p. 10).

Bromus tectorum is a dominant species on the lower slopes of the Grampian Hill population and is present in all populations of *Eriogonum soredium* and *Lepidium ostleri* (Miller 2010g, p. 5; Roth 2010a, p. 1). Surface disturbances can increase the occurrence and densities of *B. tectorum* (*see* Nonnative Invasive Species section under Factor A for *Astragalus hamiltonii*). As previously described, increased mining activities and associated surface disturbances are expected to occur in the occupied habitat for *E. soredium* and *L. ostleri,* (*see* Mining, above), providing conditions allowing *B. tectorum* to expand into and increase density within *E. soredium* and *L. ostleri* habitat.

Invasions of annual, nonnative species, such as *Bromus tectorum,* are well documented to contribute to increased fire frequencies (Brooks and Pyke 2002, p. 5; Grace *et. al* 2002, p. 43; Brooks *et. al* 2003, pp. 4, 13, 15). The disturbance caused by increased fire frequencies creates favorable conditions for increased invasion by *B. tectorum.* The end result is a downward spiral where an increase in invasive species results in more fires, more fires create more disturbances, and more disturbances lead to increased invasive species densities. The risk of fire is expected to increase from 46 to 100 percent when the cover of *B. tectorum* increases from 12 to 45 percent or more (Link *et al.* 2006, p. 116). In the absence of exotic species, it is generally estimated that fire return intervals in xeric sagebrush communities range from 100 to 350 years (Baker 2006, p. 181). In some areas of the Great Basin (Snake River Plain), fire return intervals due to *B. tectorum* invasion are now between 3 and 5 years (Whisenant 1990, p. 4). Most plant species occurring within a sagebrush ecosystem are not expected to be adapted to frequent fires, as evidenced in the lack of evolutionary adaptations found in other shrub-dominated fire adapted ecosystems like chaparral (Baker, in press, p. 17).

In the absence of *Bromus tectorum, Eriogonum soredium* and *Lepidium ostleri* grow in sparsely vegetated communities unlikely to carry fires (see Habitat section). Thus, the species are unlikely to be adapted to survive fires. As described in the distribution section, the total range of these species are less than 5 mi^2 (13 km^2) and each of the four populations occupy relatively small areas ranging between 5 ac (2 ha) and 29 ac (12 ha). A range fire could easily impact, or eliminate, one or all populations. Therefore, the potential expansion of invasive species and associated fire is a threat to the species, especially when considering the limited distribution of the species and the high potential of stochastic extinctions (as discussed in the Small Population Size section under Factor E below).

In summary, nonnative invasive species and fire are threats to both species. *Bromus tectorum* occurs in all four *Eriogonum soredium* and *Lepidium ostleri* populations. Given the ubiquitous nature of *B. tectorum* in the Intermountain West and its ability to rapidly invade dryland ecosystems (Mack 1981, p. 145, Mack and Pyke, 1983, p. 88, Thill *et al.* 1984, p. 10), we expect it to increase in the future in response to surface disturbances from increased mining activities and global climate change (*see* the Climate Change and Drought section under Factor E for *Astragalus hamiltonii*). An increase in *B. tectorum* is expected to increase the frequency of fires in *E. soredium* and *L. ostleri's* habitat, and the species are unlikely to survive increased wildfires due to their small population sizes. Therefore, we determine that nonnative invasive species and associated wildfires constitute a threat to all populations of *E. soredium* and *L. ostleri* now and into the foreseeable future.

Summary of Factor A

At this time, based on best available information, we do not believe that grazing and recreational activities significantly threaten *Eriogonum soredium* and *Lepidium ostleri* now or in the foreseeable future. However, we determine that mining and nonnative invasive species are threats to *E. soredium* and *L. ostleri.*

Mining activities impacted *Eriogonum soredium* and *Lepidium ostleri* habitat in the past and continue to be a threat to the species and its habitat throughout its range. All of the populations and the majority of habitat are located on private lands with an extensive history and recent successful exploration activities for precious metal mining. Three of the four populations are located in the immediate vicinity of gravel mining. Gravel mining is expected to continue and expand in the near future (Munson 2010, pers. comm.). Considering the small acreages of occupied habitat immediately adjacent to existing gravel pits, continued mining may result in the loss of these populations in the foreseeable future. We anticipate an increase in the demand for precious metals and landscape rock based on the economic outlook for these commodities and the lack of alternative sources for crushed limestone in southwestern Utah which will result in increased impacts to *E. soredium* and *L. ostleri* and their habitat.

Bromus tectorum is documented to occur in all four populations of *Eriogonum soredium* and *Lepidium ostleri.* The threat of fire caused by annual nonnative species invasions is exacerbated by mining activities and global climate change (*see* the Climate Change and Drought section under Factor E). The small population sizes and extremely limited distribution make this species especially vulnerable to stochastic extinction events, including localized mining activities and wildfires caused by increased invasions of nonnative species (*see* the Small Population Size section under Factor E, below).

Therefore, we find that *Eriogonum soredium* and *Lepidium ostleri* are threatened by the present or threatened destruction, modification, or curtailment of the species' habitat or range, now and in the foreseeable future, based on impacts from mining activities and nonnative invasive species.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Eriogonum soredium and *Lepidium ostleri* are considered attractive rock garden plants. In particular, *Eriogonum soredium* is considered "one of the most fantastic of its genus" by a major rock garden seed distributor (Alplains Seed Catalog 2010b, pp. 2 and 12). Seeds for both species are available commercially and they are harvested from wild populations (Alplains Seed Catalog 2010b, pp. 2 and 12).

Eriogonum soredium and *Lepidium ostleri* plants are located on private lands, which may provide some protection from collectors, as access is restricted on these private lands. Despite the attractiveness of the two species to horticultural enthusiasts, we have no information indicating that collection in the wild is a threat to the species.

In summary, overutilization for commercial purposes could be a concern to *Eriogonum soredium* and *Lepidium ostleri* due to their desirability to collectors; however, we do not have information that leads us to believe that overutilization for commercial purposes is a threat now or is likely to become one in the foreseeable future.

Factor C. Disease or Predation

Disease and herbivory of the species are unknown. We do not have any information indicating that disease is impacting either *Eriogonum soredium* or *Lepidium ostleri.* We also do not have any information indicating herbivory is occurring from livestock (*see* the Livestock Grazing section under Factor A), wildlife, or insects (Kass 1992a, p. 9; Evenden 1998, entire; Miller 2010a, entire; Miller 2010b, entire; Miller 2010c, entire; Roth 2010a, entire). Thus, we do not consider disease and predation to be threats to these species.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

There are no endangered species laws protecting plants on private, State, or Tribal lands in Utah. *Eriogonum soredium* and *Lepidium ostleri* are listed as bureau sensitive plants for the BLM. Should the species be located on BLM lands, limited policy-level protection by the BLM is afforded through the Special Status Species Management Policy Manual # 6840, which forms the basis for special status species management on BLM lands (BLM 2008e, entire).

Eriogonum soredium and *Lepidium ostleri* are predominantly threatened by mining related activities (*see* Factor A). Over 90 percent of the species' known potential habitat and all of the known populations are located on lands with private, patented mining claims (Kass 1992a, p. 9; Evenden 1998, p. 9; Roth 2010a, pp. 1–2). Mineral mining is subject to the Utah Mined Land Reclamation Act of 1975, which includes mineral mining on State and private lands, including lands with patented mining claims (Utah Code Title 40, Chapter 8). The ESA applies to all surface activities associated with the exploration, development, and extraction of mineral deposits.

The Utah Mined Land Reclamation Act mandates the preparation of State environmental impact assessments for large mining operations, which are defined as mining operations which create more than 5 ac (2 ha) of surface disturbance (UDOGM 2010b, p. 1). The existing gravel mining activities within the range of *Eriogonum soredium* and *Lepidium ostleri* (*see* Factor A, Mining) are approaching the 5-ac (2-ha) regulatory threshold. Thus, we anticipate that the operators will file for large mine permits, partially restore the disturbed areas to be below the 5-ac (2-ha) limit, or will begin new gravel pits (Munson 2010, pers. comm.).

State environmental impact assessments must address, at a minimum, the potential effects on State and federally listed species (Baker 2010, pers. comm.). *Eriogonum soredium* and *Lepidium ostleri* are not State listed but are on the BLM sensitive species list. If UDOGM is made aware of these rare species being impacted by mining activities, they could consider minimizing and mitigating impacts; however, there is no requirement to address species that are not federally listed in the mine permitting process (Baker 2010, pers. comm.).

In summary, the existing regulatory mechanisms are not adequate to protect *Eriogonum soredium* and *Lepidium ostleri* from becoming threatened or endangered by gravel mining on private lands. The active gravel pits are approaching the 5-ac (2-ha) threshold that would normally incur regulatory environmental impact assessments; however, no assessments are completed for these mines. Even if an environmental impact assessment is completed for any of the mines, the existing mining laws do not necessarily apply to BLM sensitive species: They recommend, and do not mandate, species protection or mitigation. Thus, we find that the inadequacy of existing mechanisms to regulate mining activities on private lands is a threat to all populations of *E. soredium* and *L. ostleri* now and in the foreseeable future.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Natural and manmade threats to *Eriogonum soredium* and *Lepidium ostleri's* survival include: (1) Small population size and (2) climate change and drought.

(1) Small Population Size

General potential impacts of small population sizes to plants are discussed above in the Small Population Size section under Factor E for *Astragalus hamiltonii*.

As previously described (see the Distribution and Population Status section), the entire ranges of both species are located in an area of less than 5 mi^2 (13 km^2). Within this range, each of the four individual populations' occupied habitat areas are very small, ranging from 5 ac (2 ha) to 29 ac (12 ha) (based on Miller 2010g, Appendix B).

Eriogonum soredium and *Lepidium ostleri* can be dominant in small areas of occupied habitat, containing thousands of individuals. However, the small areas of occupation and the narrow overall range of the species make it highly susceptible to stochastic extinction events and the effects of inbreeding depression.

Despite the overall lack of information on the population ecology of *Eriogonum soredium* and *Lepidium ostleri,* we know that small populations are at an increased risk of extinction due to the potential for inbreeding depression, loss of genetic diversity, and lower sexual reproduction rates (Ellstrand and Elam 1993, entire; Wilcock and Neiland 2002, p. 275). We do not have a clear understanding of the reproductive biology of *E. soredium* and *L. ostleri,* but recruitment appears to be low or episodic for *E. soredium* (Kass 1992a, p. 7; Roth 2010a, p. 1). Low levels of recruitment in small populations may be due to inbreeding depression caused by the lack of genetic diversity and low levels of genetic exchange between populations (Ellstrand and Elam 1993, entire; Wilcock and Neiland 2002, p. 275).

Mining, or a single random event such as a wildfire (*see* Factor A), could extirpate an entire or substantial portion of a population given the small acreages of occupied habitat. Species with limited ranges and restricted habitat requirements also are more vulnerable to the effects of global climate change (*see* the Climate Change and Drought section below; IPCC 2002, p. 22; Jump and Penuelas 2005, p. 1016; Machinski *et al.* 2006, p. 226; Krause 2010, p. 79).

Overall, we consider small population size an intrinsic vulnerability to *Eriogonum soredium* and *Lepidium ostleri* that may not rise to the level of a threat on its own. However, the small population sizes rise to the level of a threat because of the combined effects of small population sizes, limited distribution, and narrow overall range, compounded by the effects of global climate change (*see* below) and the potential for stochastic extinction events such as mining and invasive species (*see* Factor A). Therefore, we consider small localized population size, in combination with mining, invasive species, and climate change, to be a threat to both species now and in the foreseeable future.

(2) Climate Change and Drought

Potential impacts of climate change and drought to the geographic area are characterized under Factor E for *Astragalus hamiltonii*. As discussed above, *Eriogonum soredium* and *Lepidium ostleri* have a limited distribution and populations are localized and small. In addition, these populations are restricted to very specific soil types. Global climate change exacerbates the risk of extinction for species that are already vulnerable due to low population numbers and restricted habitat requirements (*see* the

Climate Change and Drought section under Factor E for *Astragalus hamiltonii*).

Predicted changes in climatic conditions include increases in temperature, decreases in rainfall, and increases in atmospheric carbon dioxide in the American Southwest (Walther *et al.* 2002, p. 389; IPCC 2007, p. 48; Karl *et al.* 2009, p. 129). Although we have no information on how *Eriogonum soredium* and *Lepidium ostleri* will respond to effects related to climate change, persistent or prolonged drought conditions are likely to reduce the frequency and duration of flowering and germination events, lower the recruitment of individual plants, compromise the viability of populations, and impact pollinator availability (Tilman and El Haddi 1992, p. 263; Harrison 2001, p. 78). The smallest change in environmental factors, especially precipitation, plays a decisive role in plant survival in arid regions (Herbel *et al.* 1972, p. 1084).

Drought conditions led to a noticeable decline in survival, vigor, and reproductive output of other rare and endangered plants in the Southwest during the drought years of 2001 through 2004 (Anderton 2002, p. 1; Van Buren and Harper 2002, p. 3; Van Buren and Harper 2004, entire; Hughes 2005, entire; Clark and Clark 2007, p. 6; Roth 2008a, entire; Roth 2008b, pp. 3–4). Similar responses are anticipated to adversely affect the long-term persistence of *E. soredium* and *L. ostleri.*

Climate change is expected to increase levels of carbon dioxide (Walther *et al.* 2002, p. 389; IPCC 2007, p. 48; Karl *et al.* 2009, p. 129). Elevated levels of carbon dioxide lead to increased invasive annual plant biomass, invasive seed production, and pest outbreaks (Smith *et al.* 2000, pp. 80–81; IPCC 2002, pp. 18, 32; Ziska *et al.* 2005, p. 1328) and will put additional stressors on rare plants already suffering from the effects of elevated temperatures and drought.

The actual extent to which climate change itself will impact *Eriogonum soredium* and *Lepidium ostleri* is unclear, mostly because we do not have long-term demographic information that would allow us to predict the species' responses to changes in environmental conditions, including prolonged drought. Any predictions at this point on how climate change would affect these species would be speculative. However, as previously described, the species are threatened by mining activities (*see* Mining, Factor A) which will likely result in the loss of large numbers of individuals and maybe even entire populations. Increased surface disturbances associated with mining activities also will likely increase the extent and densities of nonnative invasive species and with it the frequencies of fires (*see* Nonnative Invasive Species section under Factor A). Given the cumulative effects of the potential population reduction and habitat loss (of already small populations) associated with mining, invasive species, and fire, we are concerned about the impacts of future climate change to *Eriogonum soredium* and *Lepidium ostleri.*

In summary, we find it difficult to analyze the potential effects of global climate change on *Eriogonum soredium* and *Lepidium ostleri* in the absence of demographic trend data for the species which would allow us to analyze how they respond to climate change over time. However, because of the threats of mining, nonnative species, and small population size, the cumulative effects of climate change may be of concern for these species in the future. At this time, we believe that the state of knowledge concerning the localized effects of climate change is too speculative to determine whether climate change is a threat to these species in the foreseeable future. However, we will continue to assess the potential of climate change to threaten the species as better scientific information becomes available.

Summary of Factor E

We assessed the potential risks of small population size, climate change, and drought to *Eriogonum soredium* and *Lepidium ostleri* populations. *E. soredium* and *L. ostleri* have a highly restricted distribution and exist in four populations scattered over an area that is less than 5 mi^2 (13 km^2). Individual populations occupy very small areas with large densities of plants. Even in the absence of information on genetic diversity, inbreeding depression, and reproductive effort, we believe a random stochastic event could impact a significant portion of a population. Small populations that are restricted by habitat requirements also are more vulnerable to the effects of climate change, such as prolonged droughts and increased fire frequencies.

While naturally occurring droughts are not likely to impact the long-term persistence of the species, an increase in periodic prolonged droughts due to climate change could impact the species across their entire range in the future. Global climate change, particularly when assessed cumulatively with small population sizes and threats from mining activities, could increase the density of invasive annual plants, which are already present in the habitat of *Eriogonum soredium* and *Lepidium ostleri* (*see* Factor A). Increased nonnative species in the habitat of *E. soredium* and *L. ostleri* can increase fire frequency and severity. Because *E. soredium* and *L. ostleri* are not likely adapted to persist through fires, wildfires can have a significant impact on these small populations.

Although small population size and climate change make the species intrinsically more vulnerable, we are uncertain whether they would rise to the level of threat by themselves. However, when combined with the threats listed under Factor A (mining and nonnative invasive species), small population size is likely to rise to the level of threat in the foreseeable future. At this time, we are uncertain of the degree to which climate change constitutes a threat to the species.

Finding

As required by the ESA, we conducted a review of the status of the species and considered the five factors in assessing whether *Eriogonum soredium* and *Lepidium ostleri* are endangered or threatened throughout all or a significant portion of their range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by *E. soredium* and *L. ostleri.* We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with *E. soredium* and *L. ostleri* experts and other Federal and State agencies.

This status review identified threats to the species attributable to Factors A, D, and E. The primary threat to the species is habitat destruction from precious metal and gravel mining on private lands (Factor A). All populations are located in the vicinity of historical precious metal mining activities, at which ongoing exploration activities show the potential for continued mining activities in the foreseeable future. Three of the four populations are in the immediate vicinity of limestone quarries, all of which are considered active. We expect an increase in precious metal and limestone mining at these locations in the foreseeable future, with associated loss and fragmentation of *Eriogonum soredium* and *Lepidium ostleri* populations.

Bromus tectorum occurs within all four *Eriogonum soredium* and *Lepidium ostleri* populations. It is a highly invasive nonnative species that spreads quickly in response to surface disturbances such as mining. As previously discussed, both species occur in the immediate vicinity of precious metal and limestone mines—mines inherently cause surface disturbances from excavation activities and the construction of roads and other infrastructure. Global climate change is expected to increase drought conditions in the Southwest and increase the spread of nonnative invasive species. The biggest concern associated with the increase in invasive species is the threat of increased wildfire (Factor A), particularly when considering the small population sizes and small occupied habitat area associated with these species.

The magnitude of the biological threats posed by the species' small population sizes and limited ranges are not well understood due to the lack of information available on the ecology of *Eriogonum soredium* and *Lepidium ostleri.* Future studies may provide us with a more thorough understanding of threats posed by pollinator limitation, inbreeding depression, and the potential lack of genetic diversity over the species' range. However, the small areas of occupied habitat make the species highly vulnerable to habitat destruction through mining-related activities as well as random extinction events, including invasive species (and the inherent risk of increased fires) and the potential future effects of global climate change (Factor E).

The existing regulatory mechanisms are not adequate to protect *Eriogonum soredium* and *Lepidium ostleri* from the primary threat of mining, particularly because both species occur entirely on private lands. The inadequacy of regulatory mechanisms (Factor D) on private land, combined with the economic and commercial value of the limestone and precious metals, poses a serious threat to the continued existence of *E. soredium* and *L. ostleri*. Ongoing mining in the habitat of *E. soredium* and *L. ostleri* has the potential to extirpate one of the four populations in the near future; all populations have the potential to be extirpated by mining-related activities in the foreseeable future (Factor A; Table 3).

On the basis of the best scientific and commercial information available, we find that the petitioned action to list *Eriogonum soredium* and *Lepidium ostleri* as endangered or threatened is warranted. We will make a determination on the status of the species as endangered or threatened when we do a proposed listing determination. However, as explained in more detail below, an immediate proposal of a regulation implementing this action is precluded by higher priority listing actions, and progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants.

We reviewed the available information to determine if the existing and foreseeable threats render the species at risk of extinction now such that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the ESA is warranted. We determined that issuing an emergency regulation temporarily listing the species is not warranted at this time because there is no emergency posing a significant risk to the well-being of *Eriogonum soredium* or *Lepidium ostleri*. We do not believe that any of the potential threats are of such great immediacy and severity that would threaten all of the known populations with the imminent risk of extinction. However, if at any time we determine that issuing an emergency regulation temporarily listing *Eriogonum soredium* and *Lepidium ostleri* is warranted, we will initiate this action at that time.

Listing Priority Number

The Service adopted guidelines on September 21, 1983 (48 FR 43098), to establish a system for utilizing available resources for the highest priority species when adding species to the Lists of Endangered or Threatened Wildlife and Plants or reclassifying species listed as threatened to endangered status. These guidelines, titled "Endangered and Threatened Species Listing and Recovery Priority Guidelines," address the immediacy and magnitude of threats, as well as the level of taxonomic distinctiveness, by assigning priority in descending order to monotypic genera (genus with one species), full species, and subspecies (or equivalently, DPS of vertebrates). We assigned *Eriogonum soredium* and *Lepidium ostleri* each a Listing Priority Number (LPN) of 8, based on our finding that both species face threats of moderate magnitude that are imminent. These threats include the present or threatened destruction, modification or curtailment of their habitat, the inadequacy of existing regulatory mechanisms, and other manmade factors affecting their continued existence. These threats are ongoing and, in some cases (such as nonnative species), are considered irreversible, because, in the case of nonnative species invasions, large-scale invasions cannot be recovered to a native functioning ecosystem. Our rationale for assigning *E. soredium* and *L. ostleri* an LPN of 8 is outlined below.

Under the Service's LPN Guidance, the magnitude of threat is the first criterion we look at when establishing a listing priority. The guidance indicates that species with the highest magnitude of threat are those species facing the greatest threats to their continued existence. These species receive the highest listing priority. We consider the threats that *Eriogonum soredium* and *Lepidium ostleri* face to be moderate in magnitude because the major threats (mining, nonnative species, small population size, climate change, and inadequacy of existing regulatory mechanisms), while serious and occurring rangewide, do not collectively rise to the level of high magnitude. For example, active mining is currently impacting only one of the four populations.

The magnitude of Factor A is considered moderate, because, although we think that all populations have been impacted by mining in the past and three of the four populations occur in the immediate vicinity of gravel pits, mining activities are currently ongoing in one of these gravel pits. Ongoing mining in the habitat of *E. soredium* and *L. ostleri* is expected to increase the density of *Bromus tectorum,* thereby facilitating the spread of fire. *B. tectorum* is currently documented in all populations.

We considered the magnitude of Factor D to be moderate. All populations are located on private lands with patented mining claims, where existing regulatory mechanisms are not adequate to protect *Eriogonum soredium* and *Lepidium ostleri* from the impacts of mining. All populations have the potential to be impacted by gravel and precious metal mining in the future; however, because only one population is currently impacted by gravel mining, we consider this threat to be moderate.

We consider the magnitude of Factor E to be moderate, because although small population size and climate change make the species intrinsically more vulnerable, we are uncertain of whether they would rise to the level of threat by themselves. However, when collectively analyzed with the threats listed under Factor A, they may rise to the level of threat in the foreseeable future. Although we are uncertain about the direct impacts of global climate change on *Eriogonum soredium* and *Lepidium ostleri,* we expect the species to respond negatively to changed environmental conditions and drought, primarily from an increase in nonnative invasive species and wildfire (see Factor A). The threats of nonnative invasive species and wildfire could result in the extirpation of all populations, especially because the populations are small in size.

Under our LPN Guidance, the second criterion we consider in assigning a listing priority is the immediacy of threats. This criterion is intended to ensure that the species facing actual, identifiable threats are given priority over those for which threats are only potential or that are intrinsically vulnerable but are not known to be presently facing such threats. We consider all of the threats to be imminent because we have information that the threats are identifiable and that the species are currently facing them across their entire range. These actual, identifiable threats are covered in greater detail in Factors A, D, and E of this finding. The majority of threats are ongoing and, therefore, imminent, although gravel mining is currently impacting only one of the populations. In addition to their current existence, we expect these threats to continue and likely intensify in the foreseeable future.

The third criterion in our LPN guidance is intended to devote resources to those species representing highly distinctive or isolated gene pools as reflected by taxonomy. *Eriogonum soredium* and *Lepidium ostleri* are valid taxa at the species level and, therefore, receive a higher priority than subspecies, but a lower priority than species in a monotypic genus. Therefore, we assigned *E. soredium* and *L. ostleri* an LPN of 8.

We will continue to monitor the threats to *Eriogonum soredium* and *Lepidium ostleri* and the species' status on an annual basis, and should the magnitude or the imminence of the threats change, we will revisit our assessment of the LPN.

While we conclude that listing *Eriogonum soredium* and *Lepidium ostleri* is warranted, an immediate proposal to list this species is precluded by other higher priority listings, which we address in the Preclusion and Expeditious Progress section below. Because we have assigned *Eriogonum soredium* and *Lepidium ostleri* an LPN of 8, work on a proposed listing determination for *Eriogonum soredium* and *Lepidium ostleri* is precluded by work on higher priority listing actions with absolute statutory, court-ordered, or court-approved deadlines and final listing determinations for those species that were proposed for listing with funds from Fiscal Year (FY) 2010. This work includes all the actions listed in the tables included in the section on Preclusion and Expeditious Progress, below.

Species Information—Trifolium friscanum

Taxonomy and Species Description

Trifolium friscanum is a dwarf mat-forming or tufted perennial herb in the legume family (Fabaceae). Plants have a taproot and thick woody stem. *T. friscanum* is up to 1.2 in (3 cm) tall and has silver hairy leaves composed of three leaflets (Welsh *et al.* 2008, p. 486). Its flowers resemble those of other clover species and are arranged in heads of four to nine reddish-purple flowers with pale wings (Welsh *et al.* 2008, p. 486). Flowering occurs from late May to June, followed by fruit set in June through July (Welsh *et al.* 2008, p. 486).

Trifolium friscanum was originally described by Stanley Welsh as *T. andersonii* var. *friscanum* from specimens collected on Grampian Hill in the southern San Francisco Mountains in Beaver County, Utah (Welsh 1978, p. 355). The variety was elevated to species level in 1993 (Welsh 1993, p. 407). We accept the current taxonomy and consider *T. friscanum* to be a valid species and a listable entity under the ESA.

Distribution and Population Status

Trifolium friscanum is a narrow endemic known from five small populations containing nine sites on private, SITLA, BLM, and USFS lands in Beaver and Millard Counties, Utah (Figure 4; Table 5; Kass 1992c, pp. 4–5; Evenden 1998, pp. 6–7, Appendix C; Evenden 1999, pp. 2–3; Miller 2010c, pp. 1, 4; Miller 2010e, pers. comm.; Roth 2010a, p. 4). Populations are defined as groups of sites located in the same geographic vicinity. Sites are defined as occurrence records or locations recorded by one or more researcher over time within an individual population. Despite additional searches in the San Francisco Mountains and surrounding areas (including the Wah Wah Mountains, the Confusion Range, the Mountain Home Range, and the Tunnel Springs Mountains), no other populations are known to occur (Kass 1992c, pp. 4–5; Evenden 1998, pp. 6–7, Appendix C; Evenden 1999, pp. 2–3; Miller 2010c, pp. 1, 4; Miller 2010e, pers. comm.; Roth 2010a, p. 4).

The five populations occur within three mountain ranges in southwestern Utah (*see* Figure 4 and Table 5). The two largest populations, the Grampian Hill and San Francisco Populations, occur on the southern tip on the San Francisco Mountains in Beaver County. East of the San Francisco Mountains are the Beaver Lake Mountains, where the Lime Mountain Population occurs on Lime Mountain. West and south of the San Francisco Mountains are the Wah Wah Mountains. Along the southeastern edge of the Wah Wah Mountains is the southernmost population, the Blue Mountain population, which occurs along the Beaver–Iron County boundary line on Blue Mountain. The Tunnel Springs Population occurs on Tunnel Springs Mountains in Millard County. The Tunnel Springs Mountains are west and north of the Wah Wah Mountains.

Two of the five *Trifolium friscanum* populations overlap to some degree with the previously described *Eriogonum soredium* and *Lepidium ostleri* populations. The Grampian Hill populations of all three species occur on Grampian Hill on the southern tip of the San Francisco Mountains in the same habitat. The San Francisco population of *T. friscanum* overlaps with the Indian Queen populations of *E. soredium* and *L. ostleri.* The remaining three populations of *T. friscanum*—Blue Mountain, Lime Mountain, and Tunnel Springs—are located in nearby mountain ranges as described above.

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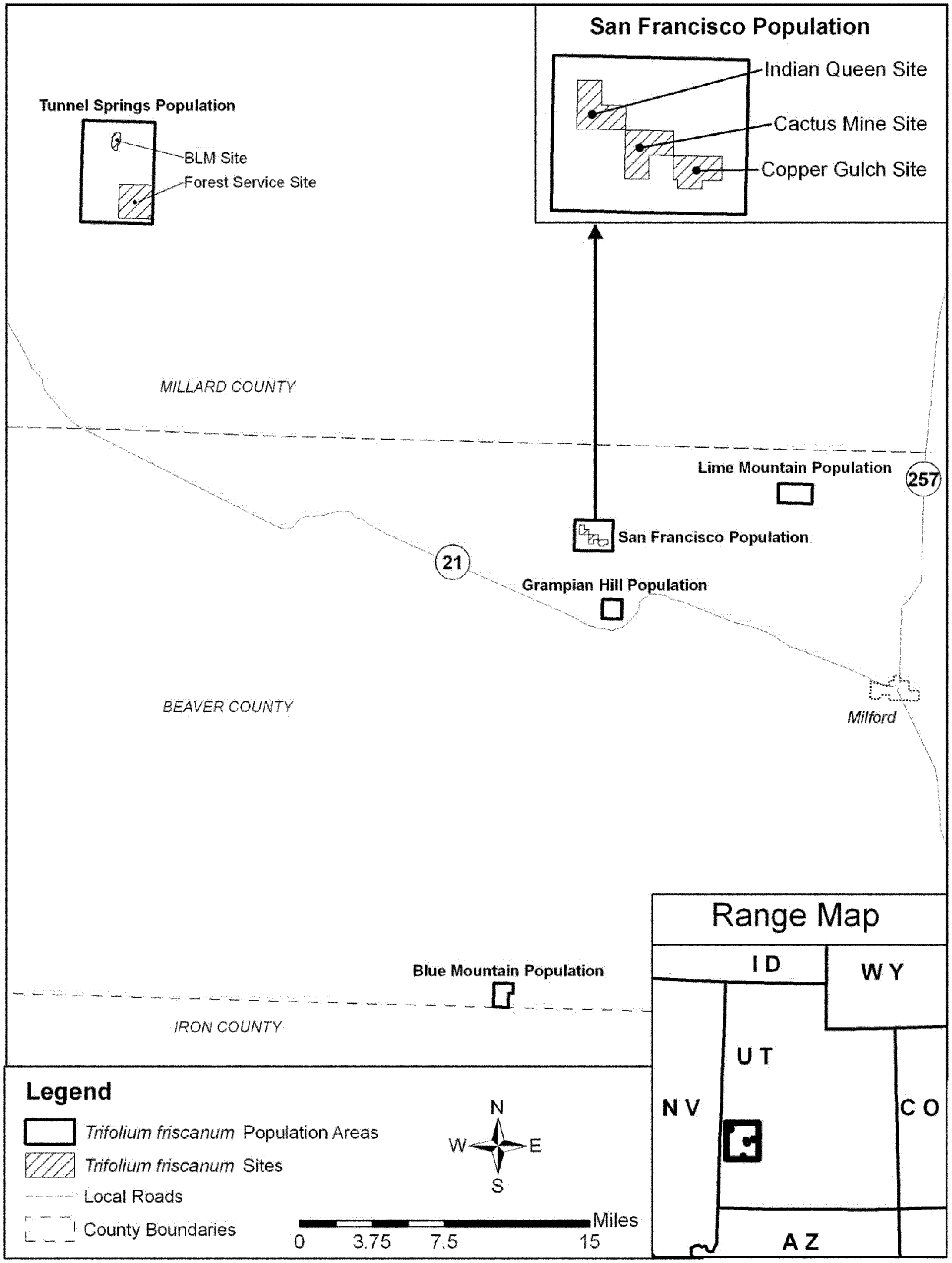

Figure 4. *Trifolium friscanum* range.

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TABLE 5—ESTIMATED NUMBER OF *Trifolium friscanum Plants*

(Evenden 1998, Appendix C; Miller 2010a, pers. comm.; Miller 2010c, pp. 1, 4; 2010d, p. 1; Roth 2010a, p. 4).

Population	Land ownership/sites	Estimated number of *Trifolium friscanum* plants
Blue Mountain	SITLA (1 site)	250.

TABLE 5—ESTIMATED NUMBER OF *Trifolium friscanum Plants*—Continued

(Evenden 1998, Appendix C; Miller 2010a, pers. comm.; Miller 2010c, pp. 1, 4; 2010d, p. 1; Roth 2010a, p. 4).

Population	Land ownership/sites	Estimated number of *Trifolium friscanum* plants
Grampian Hill	Private (1 site)	Many 1,000s.
San Francisco	BLM (Copper Gulch) (1 site)	1,000.
	Private (Cactus Mine) (1 site)	300.
	Private (Indian Queen) (1 site)	3,000.
Lime Mountain	BLM (1 site)	at least 125.
Tunnel Springs Mountains	BLM (1 site)	500.
	USFS (2 sites)*	2,000.
ESTIMATED TOTAL		13,000.

* Last surveyed in 1992. All other survey data from 2010.

Trifolium friscanum populations extend about 40 mi (64 km) from the San Francisco Mountains and stretch across 650 mi² (1,684 km²) (Figure 4). Within that area, the five populations are scattered in small, disjunct areas of occupied habitat (Figure 4; Table 5).

The majority of plants (71 percent of the estimated populations) are located in the San Francisco and Grampian Hill populations (Miller 2010g, Appendix B). Total occupied habitat for these two populations (four sites) is approximately 35 ac (14 ha), each site ranging between approximately 1 ac (0.4 ha) and 12 ac (5 ha) (Darnall *et al.* 2010, entire). The Blue Mountain population occupies an area of approximately 0.33 ac (0.13 ha) (Darnall *et al.* 2010, entire). We do not have population estimates for the areas of occupied habitat for the Tunnel Springs sites (Tunnel Springs population) or the Lime Mountain population, but we assume the area of occupied habitat to be similar to or smaller than the San Francisco, Grampian Hill, and Blue Mountain populations, because these populations contain fewer than or similar numbers of plants as those estimated for the other sites (Table 5).

The total number of *Trifolium friscanum* individuals in Table 5 was derived from observational counts or estimates. For the Grampian Hill population, the estimate was "many thousands" (Miller 2010a, pers. comm.). For the purpose of this finding, "many thousands" is interpreted as approximately 5,000 individuals. Four of the 9 sites contain 500 or fewer plants (Table 5).

The population estimates were not based on actual counts of plants but on cursory observations with inherent observer biases. Similar to *Eriogonum sorenium* and *Lepidium ostleri,* the plants grow in dense mat-forming clusters, making it difficult to determine the number of individuals within a cluster. Because individual plants are difficult to distinguish, we do not believe that the variation in population estimates reflects variation in population sizes, but is rather an artifact in survey effort and methods used. Many of the sites occur on private lands where access is restricted, so population counts are estimated from observations.

Accordingly, the available population estimates are highly variable and probably not accurate. During the 1990s, population estimates ranged from 3,500 individuals (Evenden 1998, Appendix C) to approximately 6,000 individuals (Kass 1992c, p. 8). In 2010, the total number of plants was estimated at roughly 13,000 (Table 5; Miller 2010a, pers. comm.; Miller 2010c, pp. 1, 4; Miller 2010d, p. 1; Roth 2010a, p. 4). Thus, we do not have accurate population estimates or trends for this species.

Habitat

Trifolium friscanum is a narrow endemic restricted to soils derived from volcanic gravels, Ordovician limestone, and dolomite outcrops. Soils are shallow, with gravels, rocks, and boulders on the surface (Kass 1992c, p. 3; Miller 2010d, p. 1).

In the southern San Francisco Mountains, where the majority of plants are located, there are 845 ac (342 ha) of Ordovician limestone and 719 ac (291 ha) of dolomite outcrops (Darnall *et al.* 2010, entire). Ordovician limestone is rare within a 50-mi (80-km) radius of the San Francisco Mountains, but dolomite outcrops are common in the Wah Wah Mountain Range to the west (Miller 2010g, Appendix F). We have no information on the extent of volcanic gravels in the area. As previously described (see Distribution and Population Status), we are not aware of any additional populations of the species, despite additional potentially suitable habitats.

We do not know if there are other limiting factors associated with the limestone and dolomite formations that restrict the habitat use and distribution of the species; the species occupies only a fraction of the available habitat. The two largest populations—Grampian Hill and San Francisco—occupy an estimated 35 ac (14 ha) (2.3 percent) of the available limestone and dolomite outcrops (Darnall *et al.* 2010, entire). We do not have occupied habitat area totals for the remaining three populations, but we believe they are smaller, based on field evaluations and the lower number of individuals in these populations (Kass 1992c, p. 3; Miller 2010d, p. 1; Roth 2010a, pp. 1–2).

Trifolium friscanum is typically found within sparsely vegetated pinion-juniper-sagebrush communities between 5,640 and 8,440 ft (1,720–2,573 m) in elevation. Associated species include *Ephedra* spp. (Mormon tea), *Gutierrezia sarothrae* (snakeweed), *Cercocarpus intricatus* (dwarf mountain-mahogany), and *Petradoria pumila* (rock goldenrod). Associated rare species in the southern San Francisco Mountains include *Eriogonum soredium* and *Lepidium ostleri,* which generally grow on the same substrate in similar but more open habitats adjacent to *T. friscanum.*

Life History

No information is available on the life history of this species.

Summary of Information Pertaining to the Five Factors—*Trifolium friscanum*

In making our 12-month finding on the petition, we considered and evaluated the best available scientific and commercial information pertaining to *Trifolium friscanum* in relation to the five factors provided in section 4(a)(1) of the ESA (*see* the full description of these five factors in the Summary of Information Pertaining to the Five Factors—*Astragalus hamiltonii,* above).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The following factors may affect the habitat or range of *Trifolium friscanum:*

(1) Livestock grazing, (2) recreational activities, (3) mining, and (4) nonnative invasive species.

(1) Livestock Grazing

Potential impacts of livestock grazing to plants are discussed above in the Livestock Grazing section under Factor A for *Astragalus hamiltonii.*

All *Trifolium friscanum* populations on BLM lands are located on active grazing allotments (Galbraith 2010, pers. comm.). Adjacent habitats on SITLA and private lands are subject to the same grazing practices as the allotted BLM land if the habitats are not fenced (Galbraith 2010, pers. comm.). The SITLA and private lands are only partially fenced in these areas; thus we can assume that grazing occurs. The USFS sites of the Tunnel Springs population are not grazed (Kitchen 2010, pers. comm.).

The *Trifolium friscanum* population on BLM lands in the Tunnel Springs Mountains was likely impacted by the construction of an allotment boundary fence 10 years ago (Evenden 1999, p. 7; Roth 2010a, p. 2). The fence runs along a ridge and through approximately 500 ft (150 m) of *T. friscanum* habitat (Roth 2010b, p.1). The construction of the fence may have impacted approximately 10 percent of the species' habitat in the area (Roth 2010b, p.1). Livestock and wildlife trailing occur along the fence, resulting in trampling of individual plants and soil compaction (Roth 2010a, p. 2). No plants occur within 100 ft (30 m) of either side of the fence (Roth 2010a, p. 2).

Although much of the species' habitat is accessible to livestock, we are not aware of any other disturbances or loss of plants from grazing (Kass 1992, entire; Evenden 1998, entire, Evenden 1999, entire; Pontarolo 2009, pers. comm.; Miller 2010f, pers. comm.; Roth 2010a, p. 3). Available information suggests that livestock grazing is not occurring at a level that is impacting the species (Pontarolo 2009, pers. comm.; Miller 2010f, pers. comm.; Roth 2010a, p. 3). Therefore, we have no information suggesting that grazing impacts the species now or will impact the species in the foreseeable future at a level that threatens *Trifolium friscanum.*

(2) Recreational Activities

Potential impacts of recreational activities to plants are discussed above in the Recreational Activities Section, Factor A, for *Astragalus hamiltonii.* Because we know that OHV use is widespread across the southwestern landscape, we analyzed its occurrence in *Triolium friscanum's* habitat for this finding.

Access to the majority of occupied habitat on private lands is closed to all vehicles, including OHVs (Miller 2010g, p. 5). There are no known impacts of OHV use in *Trifolium friscanum's* occupied habitat on private lands (Miller 2010f, pers. comm.; Roth 2010a, pp. 1–2). The OHV use also does not appear to impact *T. friscanum's* habitat on SITLA, BLM, or USFS lands (Pontarolo 2009, pers. comm.; 2010, pers. comm.; Miller 2010f, pers. comm.; Roth 2010a, pp. 1–2). Therefore, we do not believe that recreational activities threaten *T. friscanum* now, nor do we anticipate that these activities will become a threat in the foreseeable future.

(3) Mining

As previously described (*see* Distribution and Population Status), *Trifolium friscanum* occurs in five population areas: Blue Mountain, Grampian Hill, San Francisco, Lime Mountain, and Tunnel Springs Mountains. For purposes of the following analysis, it is important to note that the Grampian Hill and San Francisco populations occur in the southern San Francisco Mountains in the same vicinity and habitat as *Eriogonum soredium* and *Lepidium ostleri.* The other three populations are located in nearby mountain ranges.

The San Francisco Mountains have an extensive history of mining of precious metals and limestone gravel (Table 6; Evenden 1998, p. 3). We described this mining history, the likelihood of future mining activities, and effects to the species under *Eriogonum soredium* and *Lepidium ostleri,* Factor A, Mining. This analysis applies to the Grampian Hill and San Francisco populations of *Trifolium friscanum,* because the three species co-occur (*see* Distribution and Population Status). In addition, we evaluated mining activity and its impacts to the remaining three populations of *T. friscanum.*

To review, precious metal mining in the southern San Francisco Mountains is likely to impact the Grampian Hill and San Francisco populations of *Trifolium friscanum* (Table 6). The Grampian Hill population is located in the area of the King David Mine, which is part of the historical Horn Silver Mine. The San Francisco population (which overlaps the Indian Queen population of *Eriogonum soredium* and *Lepidium ostleri*) is in the vicinity of mine shafts near the Cactus Mine, an historical copper mine (*see E. soredium* and *L. ostleri,* Factor A, Mining). Although large-scale precious metal mining in the area ceased decades ago, we believe mining is likely to occur again in the foreseeable future due to patent rights and ongoing exploration for silver, zinc, and copper deposits—including recent exploration activities at the Horn Silver Mine (*see E. soredium* and *L. ostleri,* Factor A, Mining). Precious metal mining in the vicinity of the Grampian Hill and San Francisco populations is of concern because these populations comprise the species' largest known populations, containing the vast majority of known individuals (9,300 individuals, or 71 percent of the species' estimated total population) (Table 5).

The Lime Mountain population has experienced precious metal mining activity in the past (Table 6; Miller 2010h, pp. 6–7). The last mining activity occurred in the early 1980s. We do not anticipate additional mining, due to the small amounts of minerals that were extracted (Miller 2010h, p. 7). We are not aware of precious metal mining activities in the vicinity of the Blue Mountain or Tunnel Springs populations.

TABLE 6—MINING ACTIVITIES IN THE HABITAT OF *Trifolium friscanum*

Population	Mining Activity		
	Historical	Current	Future
Blue Mountain	gravel quarrying	active	gravel quarrying.
Grampian Hill	silver, lead, copper, zinc (Horn Silver Mine).	none	silver, lead, copper, zinc, landscape gravel quarrying.
San Francisco	silver, lead, copper, zinc, gravel quarrying (Cactus Mine).	active	silver, lead, copper, zinc, landscape gravel quarrying.

TABLE 6—MINING ACTIVITIES IN THE HABITAT OF *Trifolium friscanum*—Continued

Population	Mining Activity		
	Historical	Current	Future
Lime Mountain	silver, lead, copper, zinc, native gold, iron (Skylark, Independence & Galena Mines).	none	unknown.
Tunnel Springs Mountains	unknown	none	unknown.

Gravel mining is known to occur within the range of *Trifolium friscanum,* particularly in the San Francisco Mountains and Wah Wah Mountains. Impacts to *T. friscanum* from gravel mining in the southern San Francisco Mountains is similar to those analyzed for *Eriogonum soredium* and *Lepidium ostleri,* because of their co-occurrence (*see E. soredium* and *L. ostleri,* Factor A, Mining, above).

Gravel mining in the southern San Francisco Mountains is likely to impact the San Francisco population of *T. friscanum* and possibly the Grampian Hill population (Table 6). We estimate that 19 ac (8 ha) of suitable habitat is disturbed by gravel mining activities near the San Francisco population of *Trifolium friscanum.* Two quarries are located within 1,000 ft (300 m) of two sites (Cactus Mine and Copper Gulch) of the San Francisco population of *T. friscanum.* Based on habitat similarities and proximity, we believe the plant may have occupied these areas prior to the mining activity. Gravel pits in this area are considered active because they are not reclaimed—given their close proximity to known *T. friscanum* plants, these gravel pits could impact the remaining occupied habitat of the species through additional quarrying activities (i.e., removal of the entire substrate) or when roads and other infrastructure are constructed. The San Francisco population currently occupies only 15 ac (6 ha) of habitat, distributed in three sites (Copper Gulch, Cactus Mine, and Indian Queen) (Table 5; Darnall *et al.* 2010, entire).

Gravel mining also may impact the Grampian Hill population of *Trifolium friscanum* in the future. Although gravel mining is not actively occurring at Grampian Hill, gravel pits exist within 1 mi (1.6 km) of this *T. friscanum* population—near the Cupric Mine (*see E. soredium* and *L. ostleri,* Factor A, Mining, above). We do not know if gravel mining will definitely occur at the Grampian Hill population. However, mining operations are expected to either expand from the vicinity of the Cupric Mine or be moved to a new location within the species' habitat in the near future (Munson 2010, pers. comm.). Due to the limited extent of the Ordovician limestone deposits across the landscape (*see* Habitat), it is plausible that mining activities could occur at the Grampian Hill population. Even if gravel mining does not occur at the Grampian Hill population, we previously established that this population is likely to be impacted by precious metal mining.

A similar overlap in habitat types and gravel quarrying (Table 6) occurs for this species in the Blue Mountain population. The Blue Mountain population, which is less than 1 ac (0.4 ha) in size, is located on SITLA lands within a couple hundred feet (meters) of a gravel pit (Evenden 1998, p. 9; Roth 2010a, p. 4). This mine is not reclaimed and, therefore, is considered active (Darnall *et al.* 2010, entire). Therefore, we assume that continued gravel mining will ultimately impact this population if it has not already occurred. The need for gravel sources is expected to increase, because an increasing human population growth (U.S. Census Bureau 2010b, entire; Utah GOPB 2010, p. 48) will result in the need for increased road construction and maintenance in the future. Although the gravel in the Blue Mountain is mined for road construction projects, the effects analysis under *E. soredium* and *L. ostleri* (*see* Factor A, Mining) is relevant; i.e., mining for gravel will lead to the degradation and loss of suitable habitat for *Trifolium friscanum.*

As previously discussed (*see Eriogonum soredium* and *Lepidium ostleri,* Factor A, Mining, above), construction sand, gravel, and crushed stone together rank as the second most valuable commodity produced among industrial minerals in Utah (Bon and Krahulec 2009, p. 5). Gravel, stone, and rock are generally mined for local and regional distribution due to the high cost of transport. The quarries in the San Francisco Mountains are the closest crushed limestone quarries to Washington County, one of the fastest growing counties in Utah (*see E. soredium* and *L. ostleri,* Factor A). In general, there has been a net loss of local sand and gravel supply pits in the Washington County area due to ongoing urban development and the lack of available gravel pit operations on surrounding Federal lands (Blackett and Tripp 1999, p. 33). Thus, the Blue Mountain population area could become a primary source of gravel for Washington County and other nearby communities, especially because the pit's location on SITLA lands limits the need for environmental regulations. Overall, it is likely that an increasing human population growth in Washington County (U.S. Census Bureau 2010b, entire; Utah GOPB 2010, p. 48) will result in an increased demand for the limestone and gravel resources at and nearby known populations of *T. friscanum.*

To summarize, mining throughout large portions of *Trifolium friscanum's* range has impacted available habitat. Three of the five known populations are located at historical precious metal mines or gravel mines on private and SITLA lands (Table 5; Table 6; *see* Factor D). Two of these populations (San Francisco and Grampian Hill) comprise the vast majority (71 percent) of the known estimated population of *T. friscanum* (Table 5). Precious metal mining is likely to impact populations of *T. friscanum* in the foreseeable future, particularly in the vicinity of the large Grampian Hill and San Francisco populations. Gravel mining is expected to increase in the future in response to increased population growth and limited availability of active gravel pits in nearby Washington County (*see E. soredium* and *L. ostleri,* Factor A). Available information suggests that three of five populations will be significantly impacted by either precious metal or gravel mining in the foreseeable future (*see E. soredium* and *L. ostleri,* Factor A, Mining). Therefore, we have determined that mining is a threat to *T. friscanum* now and in the foreseeable future.

(4) Nonnative Invasive Species

Potential impacts of nonnative invasive species to native plants and their habitat are discussed above in *Astragalus hamiltonii,* Factor A, Nonnative Invasive Species. The annual nonnative invasive grass, *Bromus tectorum,* is considered the most ubiquitous invasive species in the Intermountain West due to its ability to rapidly invade native dryland ecosystems and outcompete native plant species (Mack 1981, p. 145; Mack and Pyke 1983, p. 88; Thill *et al.* 1984, p. 10).

Bromus tectorum occurs in the habitat and vicinity of the Grampian Hill and San Francisco *Trifolium friscanum* populations, which also is where the majority of plants occur (Table 5; Miller 2010c, pp. 2–5; Roth 2010a, p. 1). We do not know whether *B. tectorum* occurs in the other three populations, but given the ubiquitous distribution of *B. tectorum* in the Intermountain West, we expect it occurs in the vicinity of all populations (Novack and Mack, 2001, p. 115).

Surface disturbances increase the occurrence and densities of *B. tectorum* (*see Eriogonum soredium* and *Lepidium ostleri,* Factor A, Nonnative Invasive Species; Mack 1981, p. 145). As previously described, increased mining activities and associated surface disturbances are expected to occur in and adjacent to the occupied habitat for *T. friscanum* in the San Francisco and Blue Mountains (*see* Mining, above), consequently encouraging *B. tectorum* to expand into the species' habitat.

Invasions of annual nonnative species, such as *Bromus tectorum,* are well documented to contribute to increased fire frequencies (Brooks and Pyke 2002, p. 5; Grace *et al.* 2002, p. 43; Brooks *et al.* 2003, pp. 4, 13, 15). The risk of fire is expected to increase from 46 to 100 percent when the cover of *B. tectorum* increases from 12 to 45 percent or more (Link *et al.* 2006, p. 116). In the absence of exotic species, it is generally estimated that fire return intervals in xeric sagebrush communities range from 100 to 350 years (Baker 2006, p. 181). In some areas of the Great Basin (Snake River Plain), fire return intervals due to *B. tectorum* invasion are now between 3 and 5 years (Whisenant 1990, p. 4). Most plant species occurring within a sagebrush ecosystem are not expected to be adapted to frequent fires, as evidenced in the lack of evolutionary adaptations found in other shrub-dominated fire-adapted ecosystems like chaparral. Examples of such adaptation would include re-sprouting and heat-stimulated seed germination (Baker, in press, p. 17).

In the absence of annual nonnative species, *T. friscanum* grows in sparsely vegetated communities that are unlikely to carry fires (*see* Habitat section). Thus, *T. friscanum* is unlikely to be adapted to fire and, therefore, unlikely to persist through a fire. Therefore, the potential expansion of invasive species and associated fire is a threat to the species, especially when considering the limited distribution of the species and the high potential of stochastic extinctions (as discussed in the Small Population Size, Factor E, below). As described in the Distribution section, the majority of plants are located within the Grampian Hill and San Francisco populations, where occurrences of *B. tectorum* are documented. Occupied habitat in these populations ranges from 1 to 12 ac (0.4 to 5 ha).

In summary, *Bromus tectorum* occurs in the two largest *Trifolium friscanum* populations (Grampian Hill and San Francisco populations, Table 5). Given the ability of *B. tectorum* to rapidly invade dryland ecosystems (Mack 1981, p. 145; Mack and Pyke, 1983, p. 88; Thill *et al.* 1984, p. 10), we expect it to increase in the future in response to surface disturbance from increased mining activities and global climate change (*see* the Climate Change and Drought section under Factor E for *Astragalus hamiltonii*). An increase in nonnative species is expected to increase the frequency of fires in *T. friscanum's* habitat. Therefore, we determine that nonnative invasive species are a threat to two of five populations of *T. frsicanum* and the majority of individuals now, and may impact all populations in the foreseeable future when evaluated cumulatively with mining activities (and associated surface disturbances), climate change, and fire.

Summary of Factor A

At this time, based on best available information, we do not believe that grazing or recreational activities significantly threaten *Trifolium friscanum* now or in the foreseeable future. However, we determine that mining and nonnative invasive species are threats to *T. friscanum.*

Mining activities impacted *Trifolium friscanum* habitat in the past and continue to be a threat to the species and its habitat throughout large portions of its range. Two of the five populations and the majority of individuals are located on lands with an extensive history of precious metal mining; ongoing exploration activities indicate that precious metal mining is likely to threaten the species in the foreseeable future. The main threat to the majority of *T. friscanum* plants is gravel mining (Table 6). Three of the five populations are located in the vicinity of gravel pits that are mined for road and landscaping gravel. The three populations located in the vicinity of gravel mines contain the majority of plants and may be mined for gravel in the future (Table 6). We anticipate an increase in the demand for precious metals and landscape rock based on the economic outlook for these commodities, regional availability, and the proximity of these gravel mines to a rapidly expanding urban area and, therefore, an increase in impacts to *T. friscanum.*

Bromus tectorum is documented to occur in the two largest of the five populations of *Trifolium friscanum.* The threat of fire caused by annual nonnative species invasions is exacerbated by mining activities and global climate change (*see* the Climate Change and Drought section under Factor E). Small population sizes and extremely limited distribution of this species make it especially vulnerable to stochastic extinction events, including mining activities and wildfires caused by increased invasions of nonnative species (*see* the Small Population Size section under Factor E).

Therefore, we find that *Trifolium friscanum* is threatened by the present or threatened destruction, modification, or curtailment of the species' habitat or range, now and in the foreseeable future, based on impacts from mining activities and nonnative invasive species.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Trifolium friscanum is not a plant of horticultural interest. We are not aware of any overutilization or collection of *T. friscanum.* Therefore, overutilization for commercial, recreational, scientific, or educational purposes does not appear to pose a significant threat to the species now nor is it likely to become a threat in the foreseeable future.

Factor C. Disease or Predation

Disease and herbivory on the species are unknown. We do not have any information indicating that disease is impacting *Trifolium friscanum.* We also do not have any information indicating that herbivory is occurring from livestock (see the Livestock Grazing section under Factor A), wildlife, or insects (Kass 1992c, p. 10; Evenden 1998, entire; Evenden 1999, entire; Miller 2010a, p. 1; Miller 2010c, entire; Roth 2010a, entire). Thus, we do not consider disease or predation to be threats to this species.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

There are no endangered species laws protecting plants on private, State, or Tribal lands in Utah. The majority of individual plants are located on SITLA or private lands (Table 5). *Trifolium friscanum* is listed as a bureau-sensitive plant for the BLM. Limited policy-level protection by the BLM is afforded through the Special Status Species Management Policy Manual # 6840, which forms the basis for special status species management on BLM lands (BLM 2008e, entire). The two sites on USFS lands are located within the Desert Experimental Range in the Tunnel Springs Mountains (Tunnel Springs population) and appear to be secure, although the population has not been visited since 1992 (Kass 1992c, p. 11; Evenden 1998, Appendix C; Evenden 1999, p. 3).

This species is predominantly located on private or SITLA lands (Table 5), where it is threatened by mining-related activities (*see* Factor A). There are limited regulatory mechanisms in place that may protect *Trifolium friscanum* from mining on private or State lands. As described under *Eriogonum soredium* and *Lepidium ostleri,* Factor D, State environmental impact assessments are required for large mining operations for all mineral exploration, development, and extraction, including gravel pits and precious metal mining (UDOGM 2010b, p.1; Baker 2010, pers. comm.). *T. friscanum* is not State listed, but it is on the BLM sensitive species list. If UDOGM is made aware of impacts to these species, they could consider minimizing and mitigating impacts; however, there is no requirement to address species that are not federally listed in the mine permitting process (Baker 2010, pers. comm.).

The existing mining activities (*see* Factor A, Mining) are under the 5-ac (2-ha) regulatory threshold and, therefore, not subject to permitting laws (Munson 2010, pers. comm.). A few of the gravel mine pits almost exceed the 5-ac (2-ha) limit, and the operators may need to apply for permits (Munson 2010, pers. comm.); however, they also could choose to begin new gravel pits, or reclaim portions of the existing pits to remain below the 5-ac (2-ha) limit (Munson 2010, pers. comm.).

In summary, the existing regulatory mechanisms are not adequate to protect *T. friscanum* from becoming threatened or endangered by precious metal or gravel mining on SITLA and private lands. The active gravel pits are below the 5-ac (2-ha) threshold that would automatically trigger regulatory environmental impact assessments. Even if an environmental impact assessment is completed for any of the mines, the existing mining laws only recommend, and do not mandate, the species' protection or mitigation. Thus, we find that the inadequacy of existing mechanisms to regulate mining activities on private and State lands is a threat to three of five populations and the majority of individuals, and thus to *T. friscanum* now and into the foreseeable future.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Natural and manmade threats to *Trifolium friscanum's* survival include: (1) Small population size and (2) climate change and drought.

(1) Small Population Size

General potential impacts of small population sizes in plants are discussed above in the Small Population Size section under Factor E for *Astragalus hamiltonii*.

As previously discussed (*see* Distribution and Population Status, above), the entire species' range is restricted to highly specialized habitat niches, distributed in 5 populations (and 9 sites) with a total population estimate of 13,000 plants. Four of the 9 sites contain 500 or fewer individuals (Table 5). Only a fraction of the entire species' range is occupied habitat. The majority of plants are located in two populations containing four sites of occupied habitat, ranging from an estimated 1 ac (0.4 ha) to a maximum of 12 ac (5 ha) (Darnall *et al.* 2010, entire; Miller 2010g, Appendix B).

Despite the overall lack of information on the population ecology of *Trifolium friscanum,* we know that small populations are at an increased risk of extinction due to the potential for inbreeding depression, loss of genetic diversity, and lower sexual reproduction rates (Ellstrand and Elam 1993, entire; Wilcock and Neiland 2002, p. 275). No information is available on the population genetics, pollination, or reproductive effort and success of *T. friscanum*. However, the small areas of occupation and the narrow overall range of the species make it highly susceptible to stochastic extinction events and the effects of inbreeding depression.

Mining or a single random event, such as a wildfire from invasive species (*see* Factor A, Nonnative Invasive Species), could extirpate an entire or at least a substantial portion of a population, given the small areas of occupied habitat. Species with limited ranges and restricted habitat requirements also are more vulnerable to the effects of global climate change (*see* Climate Change and Drought, below) (IPCC 2002, p. 22; Jump and Penuelas 2005, p. 1016; Machinski *et al.* 2006, p. 226; Krause 2010, p. 79). Overall, we consider small population size an intrinsic vulnerability to *Trifolium friscanum,* which may not rise to the level of a threat on its own. However, the small population sizes rise to the level of a threat because of the combined effects of having only five highly localized small populations with the effects of global climate change (*see* below) and the potential for stochastic extinction events such as mining, and fire induced by invasive species (*see* Factor A). Therefore, we consider small localized population size, in combination with mining, invasive species, and climate change, to be a threat to the species now and in the foreseeable future.

(2) Climate Change and Drought

Potential impacts of climate change and drought to the geographic area are characterized in the Climate Change and Drought section under Factor E for *Astragalus hamiltonii*. As discussed in the Small Population Size section above, *Trifolium friscanum* has a limited distribution and populations are localized and small. In addition, these populations are restricted to very specific soil types. Global climate change exacerbates the risk of extinction for species that are already vulnerable due to low population numbers and restricted habitat requirements (*see* Climate Change and Drought, Factor E for *Astragalus hamiltonii,* above).

Predicted changes in climatic conditions include increases in temperature, decreases in rainfall, and increases in atmospheric carbon dioxide in the American Southwest (Walther *et al.* 2002, p. 389; IPCC 2007, p. 48; Karl *et al.* 2009, p. 129). Although we have no information on how *Trifolium friscanum* will respond to effects related to climate change, persistent or prolonged drought conditions are likely to reduce the frequency and duration of flowering and germination events, lower the recruitment of individual plants, compromise the viability of populations, and impact pollinator availability (Tilman and El Haddi 1992, p. 263; Harrison 2001, p. 78). The smallest change in environmental factors, especially precipitation, plays a decisive role in plant survival in arid regions (Herbel *et al.* 1972, p. 1084).

Drought conditions led to a noticeable decline in survival, vigor, and reproductive output of other rare and endangered plants in the Southwest during the drought years of 2001 through 2004 (Anderton 2002, p. 1; Van Buren and Harper 2002, p. 3; Van Buren and Harper 2004, entire; Hughes 2005, entire; Clark and Clark 2007, p. 6; Roth 2008a, entire; Roth 2008b, pp. 3–4). Similar responses are anticipated to adversely affect the long-term persistence of *T. friscanum.*

Climate change is expected to increase levels of carbon dioxide (Walther *et al.* 2002, p. 389; IPCC 2007, p. 48; Karl *et al.* 2009, p. 129). Elevated levels of carbon dioxide lead to increased invasive annual plant biomass, invasive seed production, and pest outbreaks (Smith *et al.* 2000, p. 80–81; IPCC 2002, pp. 18, 32; Ziska *et al.* 2005, p. 1328), and will put additional stressors on rare plants already suffering from the effects of elevated temperatures and drought.

The actual extent to which climate change itself will impact *Trifolium friscanum* is unclear, mostly because we do not have long-term demographic information that allows us to predict the species' response to changes in environmental conditions, including prolonged drought. However, as previously described, the species is threatened by mining activities (*see* Mining, Factor A, above), which will likely result in the loss of large numbers of individuals or even entire populations. Increased surface disturbances associated with mining activities also will likely increase the extent and densities of nonnative invasive species and, with these, the frequencies of fires (*see* Nonnative Invasive Species, Factor A, above). The cumulative effects of the potential reduction in population numbers and habitat loss (of already small populations) associated with mining and increased invasive species (and fire) are likely to increase the risk of the species being impacted by changes in climate.

In summary, we find it difficult to analyze the potential effects of global climate change on *Trifolium friscanum* in the absence of demographic trend data for the species which would allow us to analyze how the species responds to climate change through time. However, the cumulative effects posed by the threats of mining, nonnative species and small population size may exacerbate the effects of climate change on *T. friscanum* in the future. However, at this time, we believe that the state of knowledge concerning the localized effects of climate change within the habitat occupied by *T. friscanum* is too speculative to determine whether climate change is a threat to this species in the foreseeable future. We will continue to assess the potential of climate change to threaten the species as better scientific information becomes available.

Summary of Factor E

We assessed the potential risks of small population size, climate change, and drought to *Trifolium friscanum* populations. *T. friscanum* has a highly restricted distribution and is known from five small, localized populations. Even in the absence of information on genetic diversity, inbreeding depression, and reproductive effort, a random stochastic event could impact a significant portion of a population. Small populations that are restricted by habitat requirements are also more vulnerable to the effects of climate change, such as prolonged droughts and increased fire frequencies.

While naturally occurring droughts are not likely to impact the long-term persistence of the species, an increase in periodic prolonged droughts due to climate change is likely to impact the species across its entire range in the future. Global climate change, particularly when assessed cumulatively with small population size and threats from mining activities, is expected to increase the density of invasive annual grasses, which are already present in the habitat of *Trifolium friscanum* within the populations that contain the majority of the plants (*see* Factor A). Increased nonnative species in the habitat of *T. friscanum* can increase fire frequency and severity. Because *T. friscanum* is not likely adapted to persist through fires, wildfires can have a significant impact on these small populations.

Although small population size and climate change make the species intrinsically more vulnerable, we are uncertain whether they would rise to the level of threat by themselves. However, when combined with the threats listed under Factor A, we believe that small population size is likely to rise to the level of threat in the foreseeable future. At this time, we are uncertain of the degree to which climate change constitutes a threat to the species.

Finding

As required by the ESA, we conducted a review of the status of the species and considered the five factors in assessing whether *Trifolium friscanum* is endangered or threatened throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by *T. friscanum.* We reviewed the petition, information available in our files, as well as other available published and unpublished information, and we consulted with species experts and other Federal and State agencies.

This status review identified threats to the species attributable to Factors A, D, and E. The primary threat to the species is habitat destruction from precious metal and gravel mining on private and SITLA lands (Factor A). The largest populations containing the majority of *Trifolium friscanum* plants are located on private lands with active mining claims. These populations were likely impacted by historical precious metal mining. Another population is located on SITLA lands in the immediate vicinity of a gravel pit. We expect an increase in precious metal and gravel mining in the foreseeable future, with the associated loss and fragmentation of *T. friscanum* populations.

Bromus tectorum occurs in the vicinity of the two largest populations of the five known *Trifolium friscanum* populations. It is a highly invasive species and is expected to increase in areas where surface disturbance such as mining occurs. As previously discussed, the species occurs in the vicinity of gravel and precious metal mines. Mines inherently cause surface disturbances from excavation activities and the construction of roads and other infrastructure. Global climate change is expected to increase drought conditions in the Southwest and increase the spread of nonnative invasive species. The biggest concern associated with the increase in invasive species is the threat of increased wildfire (Factor A), particularly when considering the small population sizes and small occupied habitat acreages associated with the species.

The magnitude of the biological threats posed by the small population size and limited species range are not well understood due to the lack of information available on the ecology of *Trifolium friscanum.* Future studies may provide us with a more thorough understanding of threats posed by pollinator limitation, inbreeding depression, and the potential lack of genetic diversity over the species' range. Even without detailed knowledge on how small population sizes are impacting the biology and ecology of *T. friscanum,* the small areas of occupied habitat make the species highly vulnerable to habitat destruction through mining-related activities as well as random extinction events, including fires and the effects of global climate change (Factor E).

The existing regulatory mechanisms are not adequate to protect *Trifolium friscanum* from the primary threat of mining, particularly because the majority of individuals are located on private lands (Factor D). The inadequacy of regulatory mechanisms (Factor D) on private and State lands, combined with the high economic and commercial value of much of the substrate this species depends on, poses a serious threat to *T. friscanum.* A large portion of the species' individuals have the potential to be extirpated by mining activities in the foreseeable future (Factor A; Table 6). Ongoing mining in the habitat of *T. friscanum* has the potential to extirpate three of the five populations in the foreseeable future, two of which contain the majority of plants (Factor A, Table 5).

On the basis of the best scientific and commercial information available, we find that the petitioned action to list *Trifolium friscanum* as endangered or threatened is warranted. We will make a determination on the status of the species as endangered or threatened when we do a proposed listing determination. However, as explained in more detail below, an immediate proposal of a regulation implementing this action is precluded by higher priority listing actions, and progress is being made to add or remove qualified species from the Lists of Endangered and Threatened Wildlife and Plants.

We reviewed the available information to determine if the existing and foreseeable threats render the species at risk of extinction now such that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the ESA is warranted. We determined that issuing an emergency regulation temporarily listing the species is not warranted at this time because there is no emergency posing a significant risk to the well being of *Trifolium friscanum.* We do not believe that any of the potential threats are of such great immediacy and severity that would threaten all of the known populations with the imminent risk of extinction. However, if at any time we determine that issuing an emergency regulation temporarily listing *Trifolium friscanum* is warranted, we will initiate this action at that time.

Listing Priority Number

Pursuant to our guidelines, titled "Endangered and Threatened Species Listing and Recovery Priority Guidelines" (described above), we have assigned *Trifolium friscanum* a Listing Priority Number (LPN) of 8, based on our finding that the species faces threats that are of moderate magnitude and are imminent. These threats include the present or threatened destruction, modification, or curtailment of its habitat, the inadequacy of existing regulatory mechanisms, and other natural or manmade factors affecting its continued existence. These threats are ongoing and, in some cases (such as nonnative species), are considered irreversible because large-scale invasions cannot be recovered to a native functioning ecosystem. Our rationale for assigning *T. friscanum* an LPN of 8 is outlined below.

Under the Service's LPN guidance, the magnitude of threat is the first criterion we look at when establishing a listing priority. The guidance indicates that species with the highest magnitude of threat are those species facing the greatest threats to their continued existence. These species receive the highest listing priority. We consider the magnitude of Factor A moderate. While current mining activities are ongoing in the habitat of *T. friscanum,* they are not ongoing in the immediate vicinity of any of the populations. Mining in the habitat of these populations is expected to increase the density of B. tectorum, thereby facilitating the spread of fire. *B. tectorum* occurs in two of the five populations, which also contain the largest number of individuals. We have no documentation on the density of *B. tectorum* within these populations but we are expecting it to increase in the future.

We consider the magnitude of Factor D to be moderate. Three of the five populations are located on private or SITLA lands. The majority of individuals are located on private lands with active patented mining claims. Existing regulatory mechanisms do not adequately protect *Trifolium friscanum* from the impacts of mining on private lands. The majority of individuals (3 populations) have the potential to be impacted by mining in the future. However, because none of the populations are directly impacted by current mining levels on SITLA or private lands, we consider threats under Factor D to be moderate at this time.

We consider the magnitude of Factor E moderate, because, although small population size and climate change make the species intrinsically more vulnerable, we are uncertain of whether they would rise to the level of threat by themselves. However, when collectively analyzed with the threats listed under Factor A, they may rise to the level of threat in the foreseeable future. Although we are uncertain about the direct impacts of global climate change on *Trifolium friscanum,* we expect the species to respond negatively to changed environmental conditions and drought, especially when combined with the effects of small population size and the threat of increased mining activities.

Therefore, we consider the threats that *Trifolium friscanum* faces to be moderate in magnitude because the major threats (mining, nonnative invasive species, small population size, plus inadequacy of existing regulatory mechanisms), while serious and occurring rangewide, do not collectively rise to the level of high magnitude.

Under our LPN guidance, the second criterion we consider in assigning a listing priority is the immediacy of threats. This criterion is intended to ensure that the species facing actual, identifiable threats are given priority over those for which threats are only potential or those that are intrinsically vulnerable but are not known to be presently facing such threats. We consider all of the threats to be imminent because we have factual information that the threats are identifiable and that the species is currently facing them in many portions of its range. These actual, identifiable threats are covered in greater detail in Factors A, D, and E of this finding. The majority of threats are ongoing and, therefore, imminent, although mining is currently ongoing in the habitat of only one of the populations. In addition to their current existence, we expect these threats, except for inadequate regulations, to continue and likely intensify in the foreseeable future.

The third criterion in our LPN guidance is intended to devote resources to those species representing highly distinctive or isolated gene pools as reflected by taxonomy. *Trifolium friscanum* is a valid taxon at the species level and, therefore, receives a higher priority than subspecies, but a lower priority than species in a monotypic genus. Therefore, we assigned *T. friscanum* an LPN of 8.

We will continue to monitor the threats to *Trifolium friscanum* and the species' status on an annual basis, and, should the magnitude or the imminence of the threats change, we will revisit our assessment of the LPN.

While we conclude that listing *Trifolium friscanum* is warranted, an immediate proposal to list this species is precluded by other higher priority listings, which we address in the Preclusion and Expeditious Progress section below. Because we have assigned *T. friscanum* an LPN of 8, work on a proposed listing determination for *T. friscanum* is precluded by work on higher priority listing actions with absolute statutory, court-ordered, or court-approved deadlines and final listing determinations for those species that were proposed for listing with funds from FY 2010. This work includes all the actions listed in the tables below under expeditious progress.

Preclusion and Expeditious Progress

Preclusion is a function of the listing priority of a species in relation to the resources that are available and competing demands for those resources. Thus, in any given fiscal year, multiple factors dictate whether it will be possible to undertake work on a proposed listing regulation or whether promulgation of such a proposal is warranted but precluded by higher priority listing actions.

The resources available for listing actions are determined through the annual Congressional appropriations process. The appropriation for the Services' Listing Program is available to support work involving the following listing actions: Proposed and final listing rules; 90-day and 12-month findings on petitions to add species to the Lists of Endangered and Threatened Wildlife and Plants (Lists) or to change the status of a species from threatened to endangered; annual determinations on prior "warranted but precluded" petition findings as required under section 4(b)(3)(C)(i) of the ESA; critical habitat petition findings; proposed and final rules designating critical habitat; and litigation-related, administrative, and program-management functions (including preparing and allocating budgets, responding to Congressional and public inquiries, and conducting public outreach regarding listing and critical habitat).

The work involved in preparing various listing documents can be extensive and may include, but is not limited to: Gathering and assessing the best scientific and commercial data available and conducting analyses used as the basis for our decisions; writing and publishing documents; and obtaining, reviewing, and evaluating public comments and peer review comments on proposed rules and incorporating relevant information into final rules. The number of listing actions that we can undertake in a given year also is influenced by the complexity of those listing actions; that is, more complex actions generally are more costly. For example, during the past several years the cost (excluding publication costs) for preparing a 12-month finding, without a proposed rule, has ranged from approximately $11,000 for one species with a restricted range and involving a relatively uncomplicated analysis to $305,000 for another species that is wide ranging and involving a complex analysis.

We cannot spend more than is appropriated for the Listing Program without violating the Anti-Deficiency Act (*see* 31 U.S.C. 1341(a)(1)(A)). In addition, in FY 1998 and for each FY since then, Congress has placed a statutory cap on funds which may be expended for the Listing Program, equal to the amount expressly appropriated for that purpose in that FY. This cap was designed to prevent funds appropriated for other functions under the ESA (for example, recovery funds for removing species from the Lists), or for other Service programs, from being used for Listing Program actions (*see* House Report 105–163, 105th Congress, 1st Session, July 1, 1997).

Recognizing that designation of critical habitat for species already listed would consume most of the overall Listing Program appropriation, Congress also put a critical habitat subcap in place in FY 2002 and has retained it each subsequent year to ensure that some funds are available for other work in the Listing Program: "The critical habitat designation subcap will ensure that some funding is available to address other listing activities" (House Report No. 107–103, 107th Congress, 1st Session, June 19, 2001). In FY 2002 and each year until FY 2006, the Service has had to use virtually the entire critical habitat subcap to address court-mandated designations of critical habitat, and consequently none of the critical habitat subcap funds have been available for other listing activities. In FY 2007, we were able to use some of the critical habitat subcap funds to fund proposed listing determinations for high-priority candidate species. In FY 2009, while we were unable to use any of the critical habitat subcap funds to fund proposed listing determinations, we did use some of this money to fund the critical habitat portion of some proposed listing determinations so that the proposed listing determination and proposed critical habitat designation could be combined into one rule, thereby being more efficient in our work. In FY 2010, we are using some of the critical habitat subcap funds to fund actions with statutory deadlines.

Thus, through the listing cap, the critical habitat subcap, and the amount of funds needed to address court-mandated critical habitat designations, Congress and the courts have in effect determined the amount of money available for other listing activities. Therefore, the funds in the listing cap, other than those needed to address court-mandated critical habitat for already listed species, set the limits on our petition finding determinations.

Congress also recognized that the availability of resources was the key element in deciding, when making a 12-month petition finding, whether we would prepare and issue a listing proposal or instead make a "warranted but precluded" finding for a given species. The Conference Report accompanying Public Law 97–304, which established the current statutory deadlines and the warranted-but-precluded finding, states (in a discussion on 90-day petition findings that by its own terms also covers 12-month findings) that the deadlines were "not intended to allow the Secretary to delay commencing the rulemaking process for any reason other than that the existence of pending or imminent proposals to list species subject to a greater degree of threat would make allocation of resources to such a petition [that is, for a lower-ranking species] unwise."

In FY 2010, expeditious progress is that amount of work that can be achieved with $10,471,000, which is the amount of money that Congress appropriated for the Listing Program (that is, the portion of the Listing Program funding not related to critical habitat designations for species that are already listed). However, these funds are not enough to fully fund all our court-ordered and statutory listing actions in FY 2010, so we are using $1,114,417 of our critical habitat subcap funds in order to work on all of our required petition findings and listing determinations. This brings the total amount of funds we have for listing actions in FY 2010 to $11,585,417.

Starting in FY 2010, we also are using our funds to work on listing actions for foreign species, because that work was transferred from the Division of Scientific Authority, International Affairs Program, to the Endangered Species Program. Our process is to make our determinations of preclusion on a nationwide basis to ensure that the species most in need of listing will be addressed first and also because we allocate our listing budget on a nationwide basis. The $11,585,417 is being used to fund work in the following categories: Compliance with court orders and court-approved settlement agreements requiring that petition findings or listing determinations be completed by a specific date; section 4 (of the ESA) listing actions with absolute statutory deadlines; essential litigation-related, administrative, and listing program-management functions; and high-priority listing actions for some of our candidate species. The allocations for each specific listing action are identified in the Service's FY 2010 Allocation Table (part of our administrative record).

In FY 2007, we had more than 120 species with an LPN of 2, based on our September 21, 1983, guidance for assigning an LPN for each candidate species (48 FR 43098). Using this guidance, we assign each candidate an LPN of 1 to 12, depending on the magnitude of threats (high vs. moderate to low), immediacy of threats (imminent or nonimminent), and taxonomic status of the species (in order of priority: monotypic genus (a species that is the sole member of a genus); species; or part of a species (subspecies, DPS, or significant portion of the range)). The lower the listing priority number, the higher the listing priority (that is, a species with an LPN of 1 would have the highest listing priority). Because of the large number of high-priority species, we further ranked the candidate species with an LPN of 2 by using the following extinction-risk type criteria: International Union for the Conservation of Nature and Natural Resources (IUCN) Red list status/rank, Heritage rank (provided by NatureServe), Heritage threat rank (provided by NatureServe), and species currently with fewer than 50 individuals, or 4 or fewer populations. Those species with the highest IUCN rank (critically endangered), the highest Heritage rank (G1), the highest Heritage threat rank (substantial, imminent threats), and currently with fewer than 50 individuals, or fewer than 4 populations, comprised a group of approximately 40 candidate species ("Top 40"). These 40 candidate species have had the highest priority to receive funding to work on a proposed listing determination. As we work on proposed and final listing rules for these 40 candidates, we are applying the ranking criteria to the next group of candidates with an LPN of 2 and 3 to determine the next set of highest priority candidate species.

To be more efficient in our listing process, as we work on proposed rules for these species in the next several years, we are preparing multi-species proposals when appropriate, and these may include species with lower priority if they overlap geographically or have the same threats as a species with an LPN of 2. In addition, available staff resources also are a factor in determining high-priority species provided with funding. Finally, proposed rules for reclassification of threatened species to endangered are lower priority, since as listed species, they are already afforded the protection of the ESA and implementing regulations.

We assigned *Eriogonum soredium, Lepidium ostleri* and *Trifolium friscanum* an LPN of 8. This is based on our finding that the species face immediate and moderate magnitude threats from the present or threatened destruction, modification or curtailment of its habitat; the inadequacy of existing regulatory mechanisms; and other natural or man-made factors affecting their continued existence. These threats are ongoing and, in some cases (*e.g.,* nonnative species), considered irreversible. Under our 1983 Guidelines, a "species" facing imminent moderate-magnitude threats is assigned an LPN of 7, 8, or 9 depending on its taxonomic status. Because *E. soredium, L. ostleri* and *T. friscanum* are species, we assigned an LPN of 8 to each. Therefore, work on a proposed listing determination for *E. soredium, L. ostleri* and *T. friscanum* is precluded by work on higher priority candidate species (*i.e.,* species with LPN of 7); listing actions with absolute statutory, court ordered, or court-approved deadlines; and final listing determinations for those species that were proposed for listing with funds from previous FYs. This work includes all the actions listed in the tables below under expeditious progress.

As explained above, a determination that listing is warranted but precluded also must demonstrate that expeditious progress is being made to add or remove qualified species to and from the Lists of Endangered and Threatened Wildlife and Plants. (Although we do not discuss it in detail here, we also are making expeditious progress in removing species from the Lists under the Recovery program, which is funded by a separate line item in the budget of the Endangered Species Program. As explained above in our description of the statutory cap on Listing Program funds, the Recovery Program funds and actions supported by them cannot be considered in determining expeditious progress made in the Listing Program.) As with our "precluded" finding, expeditious progress in adding qualified species to the Lists is a function of the resources available and the competing demands for those funds. Given that limitation, we find that we are making progress in FY 2010 in the Listing Program. This progress included preparing and publishing the following determinations:

FY 2010 COMPLETED LISTING ACTIONS

Publication date	Title	Actions	**Federal Register** pages
10/08/2009	Listing *Lepidium papilliferum* (Slickspot Peppergrass) as a Threatened Species Throughout Its Range.	Final Listing, Threatened	74 FR 52013–52064.
10/27/2009	90-day Finding on a Petition To List the American Dipper in the Black Hills of SD as Threatened or Endangered.	Notice of 90-day Petition Finding, Not substantial.	74 FR 55177–55180.
10/28/2009	Status Review of Arctic Grayling (*Thymallus arcticus*) in the Upper Missouri River System.	Notice of Intent to Conduct Status Review.	74 FR 55524–55525.
11/03/2009	Listing the British Columbia DPS of the Queen Charlotte Goshawk Under the ESA: Proposed rule.	Proposed Listing Threatened	74 FR 56757–56770.
11/03/2009	Listing the Salmon-Crested Cockatoo as Threatened Throughout Its Range with Special Rule.	Proposed Listing Threatened	74 FR 56770–56791.
11/23/2009	Status Review of Gunnison sage-grouse (*Centrocercus minimus*)	Notice of Intent to Conduct Status Review.	74 FR 61100–61102.
12/03/2009	12-Month Finding on a Petition to List the Black-tailed Prairie Dog as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	74 FR 63343–63366.
12/03/2009	90-Day Finding on a Petition to List Sprague's Pipit as Threatened or Endangered.	Notice of 90-day Petition Finding, Substantial.	74 FR 63337–63343.
12/15/2009	90-Day Finding on Petitions To List Nine Species of Mussels From TX as Threatened or Endangered With Critical Habitat.	Notice of 90-day Petition Finding, Substantial.	74 FR 66260–66271.
12/16/2009	Partial 90-Day Finding on a Petition to List 475 Species in the Southwestern U.S. as Threatened or Endangered With Critical Habitat.	Notice of 90-day Petition Finding, Not substantial & Substantial.	74 FR 66865–66905.

FY 2010 COMPLETED LISTING ACTIONS—Continued

Publication date	Title	Actions	**Federal Register** pages
12/17/2009	12-month Finding on a Petition To Change the Final Listing of the DPS of the Canada Lynx To Include NM.	Notice of 12-month petition finding, Warranted but precluded.	74 FR 66937–66950.
01/05/2010	Listing Foreign Bird Species in Peru & Bolivia as Endangered Throughout Their Range.	Proposed Listing, Endangered	75 FR 605–649.
01/05/2010	Listing Six Foreign Birds as Endangered Throughout Their Range	Proposed Listing, Endangered	75 FR 286–310.
01/05/2010	Withdrawal of Proposed Rule to List Cook's Petrel	Proposed rule, withdrawal	75 FR 310–316.
01/05/2010	Final Rule to List the Galapagos Petrel & Heinroth's Shearwater as Threatened Throughout Their Ranges.	Final Listing, Threatened	75 FR 235–250.
01/20/2010	Initiation of Status Review for *Agave eggersiana & Solanum conocarpum*.	Notice of Intent to Conduct Status Review.	75 FR 3190–3191.
02/09/2010	12-month Finding on a Petition to List the American Pika as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	75 FR 6437–6471.
02/25/2010	12-Month Finding on a Petition To List the Sonoran Desert Population of the Bald Eagle as a Threatened or Endangered DPS.	Notice of 12-month petition finding, Not warranted.	75 FR 8601–8621.
02/25/2010	Withdrawal of Proposed Rule To List the Southwestern Washington/Columbia River DPS of Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*) as Threatened.	Withdrawal of Proposed Rule to List.	75 FR 8621–8644.
03/18/2010	90-Day Finding on a Petition to List the Berry Cave Salamander as Endangered.	Notice of 90-day Petition Finding, Substantial.	75 FR 13068–13071.
03/23/2010	90-Day Finding on a Petition to List the Southern Hickorynut Mussel (*Obovaria jacksoniana*) as Endangered or Threatened.	Notice of 90-day Petition Finding, Not substantial.	75 FR 13717–13720.
03/23/2010	90-Day Finding on a Petition to List the Striped Newt as Threatened.	Notice of 90-day Petition Finding, Substantial.	75 FR 13720–13726.
03/23/2010	12-Month Findings for Petitions to List the Greater Sage-Grouse (*Centrocercus urophasianus*) as Threatened or Endangered.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 13910–14014.
03/31/2010	12-Month Finding on a Petition to List the Tucson Shovel-Nosed Snake (*Chionactis occipitalis klauberi*) as Threatened or Endangered with Critical Habitat.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 16050–16065.
04/05/2010	90-Day Finding on a Petition To List Thorne's Hairstreak Butterfly as or Endangered.	Notice of 90-day Petition Finding, Substantial.	75 FR 17062–17070.
04/06/2010	12-month Finding on a Petition To List the Mountain Whitefish in the Big Lost River, ID, as Endangered or Threatened.	Notice of 12-month petition finding, Not warranted.	75 FR 17352–17363.
04/06/2010	90-Day Finding on a Petition to List a Stonefly (*Isoperla jewetti*) and a Mayfly (*Fallceon eatoni*) as Threatened or Endangered with Critical Habitat.	Notice of 90-day Petition Finding, Not substantial.	75 FR 17363–17367.
04/07/2010	12-Month Finding on a Petition to Reclassify the Delta Smelt From Threatened to Endangered Throughout Its Range.	Notice of 12-month petition finding, Warranted but precluded.	75 FR 17667–17680.
04/13/2010	Determination of Endangered Status for 48 Species on Kauai & Designation of Critical Habitat.	Final Listing, Endangered	75 FR 18959–19165.
04/15/2010	Initiation of Status Review of the North American Wolverine in the Contiguous U.S.	Notice of Initiation of Status Review.	75 FR 19591–19592.
04/15/2010	12-Month Finding on a Petition to List the Wyoming Pocket Gopher as Endangered or Threatened with Critical Habitat.	Notice of 12-month petition finding, Not warranted.	75 FR 19592–19607.
04/16/2010	90-Day Finding on a Petition to List a DPS of the Fisher in Its U.S. Northern Rocky Mountain Range as Endangered or Threatened with Critical Habitat.	Notice of 90-day Petition Finding, Substantial.	75 FR 19925–19935.
04/20/2010	Initiation of Status Review for Sacramento splittail (*Pogonichthys macrolepidotus*).	Notice of Initiation of Status Review.	75 FR 20547–20548.
04/26/2010	90-Day Finding on a Petition to List the Harlequin Butterfly as Endangered.	Notice of 90-day Petition Finding, Substantial.	75 FR 21568–21571.
04/27/2010	12-Month Finding on a Petition to List Susan's Purse-making Caddisfly (*Ochrotrichia susanae*) as Threatened or Endangered.	Notice of 12-month petition finding, Not warranted.	75 FR 22012–22025.
04/27/2010	90-Day Finding on a Petition to List the Mohave Ground Squirrel as Endangered with Critical Habitat.	Notice of 90-day Petition Finding, Substantial.	75 FR 22063–22070.
05/04/2010	90-Day Finding on a Petition to List Hermes Copper Butterfly as Threatened or Endangered.	Notice of 90-day Petition Finding, Substantial.	75 FR 23654–23663.
06/01/2010	90-Day Finding on a Petition To List *Castanea pumila* var. *ozarkensis*.	Notice of 90-day Petition Finding, Substantial.	75 FR 30313–30318.
06/01/2010	12-Month Finding on a Petition to List the White-tailed Prairie Dog as Endangered or Threatened.	Notice of 12-month petition finding, Not warranted.	75 FR 30338–30363.
06/09/2010	90-Day Finding on a Petition To List van Rossem's Gull-billed Tern as Endangered or Threatened.	Notice of 90-day Petition Finding, Substantial.	75 FR 32728–32734.

Our expeditious progress also includes work on listing actions that we funded in FY 2010 but have not yet been completed to date. These actions are listed below. Actions in the top section of the table are being conducted under a deadline set by a court. Actions in the middle section of the table are being conducted to meet statutory timelines, that is, timelines required under the ESA. Actions in the bottom section of the table are high-priority listing actions. These actions include work primarily on species with an LPN of 2, and selection of these species is partially based on available staff resources, and when appropriate, include species with a lower priority if they overlap geographically or have the same threats as the species with the high priority. Including these species together in the same proposed rule results in considerable savings in time and funding, as compared to preparing separate proposed rules for each of them in the future.

ACTIONS FUNDED IN FY 2010 BUT NOT YET COMPLETED

Species	Action
Actions Subject to Court Order/Settlement Agreement:	
6 Birds from Eurasia	Final listing determination.
Flat-tailed horned lizard	Final listing determination.
Mountain plover	Final listing determination.
6 Birds from Peru	Proposed listing determination.
Sacramento splittail	Proposed listing determination.
Gunnison sage-grouse	12-month petition finding.
Wolverine	12-month petition finding.
Montana Arctic grayling	12-month petition finding.
Agave eggersiana	12-month petition finding.
Solanum conocarpum	12-month petition finding.
Mountain plover	12-month petition finding.
Thorne's Hairstreak Butterfly	12-month petition finding.
Hermes copper butterfly	12-month petition finding.
Actions With Statutory Deadlines:	
Casey's june beetle	Final listing determination.
Georgia pigtoe, interrupted rocksnail, and rough hornsnail	Final listing determination.
2 Hawaiian damselflies	Final listing determination.
African penguin	Final listing determination.
3 Foreign bird species (Andean flamingo, Chilean woodstar, St. Lucia forest thrush)	Final listing determination.
5 Penguin species	Final listing determination.
Southern rockhopper penguin—Campbell Plateau population	Final listing determination.
5 Bird species from Colombia and Ecuador	Final listing determination.
7 Bird species from Brazil	Final listing determination.
Queen Charlotte goshawk	Final listing determination.
Salmon crested cockatoo	Proposed listing determination.
Black-footed albatross	12-month petition finding.
Mount Charleston blue butterfly	12-month petition finding.
Least chub [1]	12-month petition finding.
Mojave fringe-toed lizard [1]	12-month petition finding.
Pygmy rabbit (rangewide) [1]	12-month petition finding.
Kokanee—Lake Sammamish population [1]	12-month petition finding.
Delta smelt (uplisting)	12-month petition finding.
Cactus ferruginous pygmy-owl [1]	12-month petition finding.
Northern leopard frog	12-month petition finding.
Tehachapi slender salamander	12-month petition finding.
Coqui Llanero	12-month petition finding.
White-sided jackrabbit	12-month petition finding.
Jemez Mountains salamander	12-month petition finding.
Dusky tree vole	12-month petition finding.
Eagle Lake trout [1]	12-month petition finding.
29 of 206 species	12-month petition finding.
Desert tortoise—Sonoran population	12-month petition finding.
Gopher tortoise—eastern population	12-month petition finding.
Amargosa toad	12-month petition finding.
Pacific walrus	12-month petition finding.
Wrights marsh thistle	12-month petition finding.
67 of 475 southwest species	12-month petition finding.
9 Southwest mussel species	12-month petition finding.
14 parrots (foreign species)	12-month petition finding.
Berry Cave salamander [1]	12-month petition finding.
Striped Newt [1]	12-month petition finding.
Fisher—Northern Rocky Mountain Range [1]	12-month petition finding.
Mohave Ground Squirrel [1]	12-month petition finding.
Puerto Rico Harlequin Butterfly	12-month petition finding.
Western gull-billed tern	12-month petition finding.
Ozark chinquapin (*Castanea pumila* var. *ozarkensis*)	12-month petition finding.
Southeastern population of snowy plover and wintering population of piping plover [1]	90-day petition finding.
Eagle Lake trout [1]	90-day petition finding.
Smooth-billed ani [1]	90-day petition finding.
Bay Springs salamander [1]	90-day petition finding.
32 species of snails and slugs [1]	90-day petition finding.
Calopogon oklahomensis [1]	90-day petition finding.
White-bark pine	90-day petition finding.
42 snail species (Nevada and Utah)	90-day petition finding.
HI yellow-faced bees	90-day petition finding.
Red knot *roselaari subspecies*	90-day petition finding.

ACTIONS FUNDED IN FY 2010 BUT NOT YET COMPLETED—Continued

Species	Action
Honduran emerald	90-day petition finding.
Peary caribou	90-day petition finding.
Plains bison	90-day petition finding.
Giant Palouse earthworm	90-day petition finding.
Mexican gray wolf	90-day petition finding.
Spring Mountains checkerspot butterfly	90-day petition finding.
Spring pygmy sunfish	90-day petition finding.
San Francisco manzanita	90-day petition finding.
Bay skipper	90-day petition finding.
Unsilvered fritillary	90-day petition finding.
Texas kangaroo rat	90-day petition finding.
Spot-tailed earless lizard	90-day petition finding.
Eastern small-footed bat	90-day petition finding.
Northern long-eared bat	90-day petition finding.
Prairie chub	90-day petition finding.
10 species of Great Basin butterfly	90-day petition finding.
6 sand dune (scarab) beetles	90-day petition finding.
Golden-winged warbler	90-day petition finding.
Sand-verbena moth	90-day petition finding.
Aztec (beautiful) gilia	90-day petition finding.
Arapahoe snowfly	90-day petition finding.
High-Priority Listing Actions: [3]	
19 Oahu candidate species [3] (16 plants, 3 damselflies) (15 with LPN = 2, 3 with LPN = 3, 1 with LPN = 9).	Proposed listing.
17 Maui-Nui candidate species [3] (14 plants, 3 tree snails) (12 with LPN = 2, 2 with LPN = 3, 3 with LPN = 8).	Proposed listing.
Sand dune lizard [3] (LPN = 2)	Proposed listing.
2 Arizona springsnails [3] (*Pyrgulopsis bernadina* (LPN = 2), *Pyrgulopsis trivialis* (LPN = 2)	Proposed listing.
2 New Mexico springsnails [3] (*Pyrgulopsis chupaderae* (LPN = 2), *Pyrgulopsis thermalis* (LPN = 11)	Proposed listing.
2 mussels [3] (rayed bean (LPN = 2), snuffbox (No LPN)	Proposed listing.
2 mussels [3] (sheepnose (LPN = 2), spectaclecase (LPN = 4))	Proposed listing.
Ozark hellbender [2] (LPN = 3)	Proposed listing.
Altamaha spinymussel [3] (LPN = 2)	Proposed listing.
5 southeast fish [3] (rush darter (LPN = 2), chucky madtom (LPN = 2), yellowcheek darter (LPN = 2), Cumberland darter (LPN = 5), laurel dace (LPN = 5).	Proposed listing.
8 southeast mussels (southern kidneyshell (LPN = 2), round ebonyshell (LPN = 2), Alabama pearlshell (LPN = 2), southern sandshell (LPN = 5), fuzzy pigtoe (LPN = 5), Choctaw bean (LPN = 5), narrow pigtoe (LPN = 5), & tapered pigtoe (LPN = 11)).	Proposed listing.
3 Colorado plants [3] (Pagosa skyrocket (*Ipomopsis polyantha*) (LPN = 2), Parchute beardtongue (*Penstemon debilis*) (LPN = 2), Debeque phacelia (*Phacelia submutica*) (LPN = 8)).	Proposed listing.
2 Texas plants (Texas golden gladecress (*Leavenworthia texana*) (LPN = 2), Neches River rose mallow (*Hibiscus dasycalyx*) (LPN = 5)).	Proposed listing.
Florida bonneted bat (LPN = 2)	Proposed listing.
Kittlitz's murrelet (LPN = 2)	Proposed listing.

[1] Funds for listing actions for these species were provided in previous FYs.
[2] We funded a proposed rule for this subspecies with an LPN of 3 ahead of other species with LPN of 2, because the threats to the species were so imminent and of a high magnitude that we considered emergency listing if we were unable to fund work on a proposed listing rule in FY 2008.
[3] Funds for these high-priority listing actions were provided in FY 2008 or 2009.

We have endeavored to make our listing actions as efficient and timely as possible, given the requirements of the relevant law and regulations, and constraints relating to workload and personnel. We are continually considering ways to streamline processes or achieve economies of scale, such as by batching related actions together. Given our limited budget for implementing section 4 of the ESA, these actions described above collectively constitute expeditious progress.

Eriogonum soredium, Lepidium ostleri, and *Trifolium friscanum* will be added to the list of candidate species upon publication of this 12-month finding. We will continue to monitor the status of these species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

We intend that any proposed listing action for *Eriogonum soredium, Lepidium ostleri,* and *Trifolium friscanum* will be as accurate as possible. Therefore, we will continue to accept additional information and comments from all concerned governmental agencies, the scientific community, industry, or any other interested party concerning this finding.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* or upon request from the Utah Ecological Services Field Office (*see* **ADDRESSES** section).

Authors

The primary authors of this notice are the staff members of the Utah Ecological Services Field Office.

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: February 2, 2011.

Rowan W. Gould,

Acting Director, Fish and Wildlife Service.

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