U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Astragalus schmolliae

Common Name:

Schmoll milk-vetch

Lead region:

Region 6 (Mountain-Prairie Region)

Information current as of:

03/31/2014

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

> ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
>
> ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
>
> ___ Range is no longer a U.S. territory
>
> ___ Insufficient information exists on biological vulnerability and threats to support listing
>
> ___ Taxon mistakenly included in past notice of review
>
> ___ Taxon does not meet the definition of "species"
>
> ___ Taxon believed to be extinct
>
> ___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

Petition Information

___ Non-Petitioned

_X_ Petitioned - Date petition received: 07/30/2007

90-Day Positive:08/18/2009

12 Month Positive:12/15/2010

Did the Petition request a reclassification? **No**

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing? **Yes**

Explanation of why precluded:

Higher priority listing actions, including court approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (http://endangered.fws.gov/) provides information on listing actions taken during the last 12 months.

Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: Colorado
- **US Counties**:County information not available
- **Countries**:Country information not available

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: Colorado
- **US Counties**: Montezuma, CO
- **Countries**:Country information not available

Land Ownership:

Land ownership is approximately 50 percent federal and 50 percent tribal. Schmoll milkvetch habitat collectively occupies approximately 1,619 ha (4,000 ac) in Mesa Verde National Park (MEVE) and on the Ute Mountain Ute Tribal Park (Tribal Park). About 809 ha (2,000 ac) are in MEVE on Chapin Mesa including Fewkes and Spruce Canyons, on the West Chapin Spur, and on Park Mesa (Colorado Natural Heritage Program (CNHP) 2010, pp. 12-19; Anderson 2004, p. 25, 30; Nelligan 2010, p.1). Occupied habitat on Chapin Mesa in the Tribal Park south of MEVE probably covers another 809 ha (2,000 ac), where surveys have not been done (Anderson 2004, p. 6; Friedlander 1980, p. 53; CNHP 2010, pp. 20-21).

Lead Region Contact:

OFC OF THE RGNL DIR, Sarah Fierce, 303 236-4388, Sarah_Fierce@fws.gov

Lead Field Office Contact:

WSTRN CO ESFO, Ellen Mayo, 9706287184, ellen_mayo@fws.gov

Biological Information

Species Description:

Schmoll milkvetch plants are upright perennials, 30 to 60 cm (12 to 24 in.) tall with one to several stems branching from an underground root crown. Its leaves are typical of many of the legumes, with 11 to 20 small leaflets on a stem. Leaves and stems are ash-colored due to a covering of short hairs. Flowers are creamy white, on upright stalks that extend above the leafy stems. The fruit is a pod, 3 to 4 cm (1 to 1.5 in.) long, covered with flat, stiff hairs, pendulous and curving downward (Barneby 1964, pp. 277278). The deep taproot grows to 40 cm (16 in.) or more (Friedlander 1980, pp. 5962). Young Schmoll milkvetch plants without flowers or fruit strongly resemble young plants of a similar species, *Astragalus wingatanus* (Fort Wingate milkvetch) (Wender 2012a, p.1).

Taxonomy:

Astragalus schmolliae was first collected in Montezuma County, southwestern Colorado, in 1890. It was formally described as a species in 1945, when C.L. Porter named it after Dr. Hazel Marguerite Schmoll (Porter 1945, pp. 100102; Barneby 1964, pp. 277278; Isely 1998, p. 417). *Astragalus schmolliae* is a member of the family Fabaceae (legume family).

Habitat/Life History:

Schmoll milkvetch plants emerge in early spring and usually begin flowering in late April or early May. Flowering continues into early or mid-June (Friedlander 1980, p. 63, Peterson 1981, p. 14). Fruit set begins in late May and occurs through June, and by late June most fruits have opened and released their seeds, while still attached to the plant. The typical plant lifespan of Schmoll milkvetch is unknown, but individuals are thought to live up to 20 years (Colyer 2002 in Anderson 2004, p. 11). During very dry years, as observed in 2002, the plants can remain dormant with no above-ground growth (Colyer 2003 in Anderson 2004, p. 11). Most of the plants produce above-ground shoots and flower profusely during growing seasons following wet winters.

Schmoll milkvetch requires pollination by insects to set fruit. Flowers require a strong insect for pollination, such as a bumblebee, because the insect must force itself between the petals of the butterfly-shaped flowers. Pollinators observed on Schmoll milkvetch include several species of bumblebees (*Bombus spp*.) and beeflies (*Bombylius spp*.) (Friedlander 1980, p. 63). In a 2012 study, nearly all observed pollinators were ground-nesting bees, which indicates that their preferred nesting habitats should be identified and protected from compaction and trampling disturbances (Green 2012, p. 6).

The habitat for Schmoll milkvetch is mature pinyon-juniper woodland of mesa tops in the Mesa Verde National Park (MEVE) area at elevations between 1,981 to 2,286 meters (6,500 to 7,500 feet) (Anderson 2004, p. ii). The plants are found in both sunny and shaded locations (Peterson 1981, p. 12), primarily on deep, reddish loess soils, and are generally less common near cliff edges and in ravines where the soil is shallower. No Schmoll milkvetch plants are found in the mountain shrublands at the upper elevations on MEVE.

Historical Range/Distribution:

Same as current range.

Current Range Distribution:

Schmoll milkvetch habitat collectively occupies approximately 1,619 ha (4,000 ac) in MEVE and on the Ute Mountain Ute Tribal Park (Tribal Park). About 809 ha (2,000 ac) are in MEVE on Chapin Mesa including Fewkes and Spruce Canyons, on the West Chapin Spur, and on Park Mesa (CNHP 2010, pp. 1219; Anderson 2004, p. 25, 30; Nelligan 2010, p.1). Occupied habitat on Chapin Mesa in the Tribal Park south of MEVE probably covers another 809 ha (2,000 ac), where surveys have not been done (Anderson 2004, p. 6; Friedlander 1980, p. 53; CNHP 2010, pp. 2021). In 2012, 9 plants were found in Navajo Canyon and 7 along canyon benches near Square Tower House. This increases the evidence that Schmoll milkvetch is not limited to mesa tops, although that remains the core habitat. (Wender 2012b, p. 1).

The distribution of Schmoll milkvetch is typical of narrow endemics, which are often common within their narrow range on a specific habitat type (Rabinowitz 1981 in Anderson 2004, p. 3). However, Schmoll milkvetch is unusual because similar habitat is widespread on nearby mesas where the species has not been found. Thus, the causes of its rarity are unknown. Its distribution may be limited by habitat variables that are not yet understood (Anderson 2004, p. 8).

On Chapin Mesa, most of the Schmoll milkvetch plants are on higher ground near the border with MEVE. Plants are most abundant and many recruits are observed where they are shaded by pinyon pine. Plants become increasingly sparse and no recruits are seen on the lower southern tip of Chapin Mesa, where there is less tree cover and the ground is warmer and drier (Natori and Clow 2011, pers. comm.).

Population Estimates/Status:

The total estimated number of Schmoll milkvetch plants in MEVE was 482,786 in 2001 before the Long Mesa fire described in factor A. In 2003 after the fire the total estimated number of plants was 294,499 (CNHP 2010, pp. 121; Anderson 2004, p. 6, 30). A 2011 population estimate based on CNHP surveys was 253,000 plants (Wender and Owen 2012). Surveys in the headquarters and adjacent picnic areas indicated a decline in plant density from the population-wide density estimates from 2003 (Wender 2012, p.1). A slight decline in density of Schmoll milkvetch on Chapin Mesa was also found in a comparison of monitoring results from 2003 and 2011 (Anderson and Kuhn 2012, p. 3). Below-average precipitation in 2012 resulted in smaller, less vigorous plants than in 2011 (Wender 2012b, p.1). In 2013, a new patch of several plants was found on a bench in the slope northwest of Pictograph Point at about 6,500 ft (San Miguel 2014, p. 7).

Abundant plants were observed on the tribal land in 1987 (Colyer 2002, in Anderson 2004, p. 4; CNHP 2010, p. 21). We have no estimate of plant numbers on the Tribal Park because no inventories have been completed (Clow 2010, pers. comm.).

Schmoll milkvetch is considered critically imperiled globally (G1) by the CNHP, a rank used for species with a restricted range, a global distribution consisting of less than five occurrences, a limited population size, or significant threats (CNHP 2006, p. 1).

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

The following potential factors that may affect the habitat or range of Schmoll milkvetch are discussed in this section, including: (1) Wildfire; (2) invasive nonnative plants; (3) post-fire mitigation; (4) wildfire and fuels management; (5) feral horse activity; (6) development of infrastructure; and (7) drought and climate change.

Wildfire

Six large wildfires burned within MEVE between 1989 and 2003, and extensive portions of those burned areas have been invaded by nonnative plant species (weeds) (Floyd *et al*. 2006, p. 247). Small, lightning-caused fires are frequent in MEVE. The annual average number of fire starts between 1926 and 1969 was 5 per year, which increased to 18 per year between 1970 and 1997. Most of the fires started in the pinyon-juniper woodlands and burned less than 1 ha (2.5 ac). The southern half of MEVE was covered with dense, old-growth pinyon-juniper woodlands that had not burned for several centuries. However, the 20th century has seen several wildfires that burned extensive portions of these pinyon-juniper woodlands (Floyd *et al*. 1999, p. 149). Best estimates for natural fire turnover times in MEVE are about 100 years for shrubland vegetation and about 400 years for pinyon-juniper vegetation. Although the disturbance regime for this system apparently remains within the historical range of variability, the recovery processes following fire have been dramatically altered from historical processes (Floyd *et al*. 2006, p. 248). Recurrent fires favor clonal, resprouting shrub species such as *Quercus gambelii* (gambel oak), *Amelanchier utahensis* (Utah serviceberry), *Symphoricarpos oreophilus* (mountain snowberry), *Fendlera rupicola* (cliff fendlerbush), and *Rhus trilobata* (three-leaf sumac), and gradually eliminate the fire-sensitive pinyon and juniper (Floyd *et al*. 2000, p. 1667, 1677). Schmoll milkvetch does not grow in the shrub-dominated areas of MEVE now, and we cannot predict the long- term success of the species following removal of the pinyon-juniper overstory.

From July 29 to August 4, 2002, the Long Mesa Fire burned 1,053 ha (2,601 ac) on Chapin and Park Mesas, which included about 306 ha (756 ac) of Schmoll milkvetch habitat (Anderson 2004, p. 28). Between 1996 and 2008, 308 ha (762 ac) of habitat were burned by wildfires, and 6 ha (15 ac), by prescribed burns (Nelligan 2010, p. 1). On Tribal Park habitat, several small fires appear to have burned a total of about 23 ha (57 ac) (Glenne 2010, map). Altogether, these recent fires have impacted about 21 percent of the total habitat for the species.

The average density per square meter of plants on monitoring plots in MEVE decreased 39 percent from 2001 to 2003 (Anderson 2004, p. 30, 37). Density declined in both burned and unburned transect segments between 2001 and 2003. The decline in density was slightly lower in burned transect segments than in unburned, but the difference in density in 2003 between burned and unburned transect segments was not statistically significant, suggesting that burning did not significantly impact plant mortality, nor did it result in any benefit to the species. Therefore, we do not believe that fire itself has direct negative effects that constitute a threat to Schmoll milkvetch. The 39 percent decline in density in MEVE was attributed to the 2002 drought and prolonged dormancy, because the plants do not send up new growth during very dry years (Anderson 2004, p. 37).

No seedlings were observed in 2001 on burned or unburned habitat, but they were observed in 2003 throughout the range of Schmoll milkvetch in MEVE, except at the population on northern Park Mesa that was severely burned in 1996 (Anderson 2004, p. 39). There were no clear differences in seedling success between burned and unburned areas during early summer surveys, but survivorship of seedlings through their first summer could not be determined (Anderson 2004, p. 48). Viability of seeds collected in 2003 was between 94 and 100 percent (Anderson 2004, p. 49). The patterns of seed germination are suggestive of a species that maintains a persistent seed bank (Anderson 2004, p. 47). The longevity of seeds of Schmoll milkvetch is not known, but many legumes, including members of the genus *Astragalus* have seeds as long-lived as 97 years (Anderson 2004, p. 48). Recruitment appears to be highly episodic and is probably greatest in years that are moist in March through May (Anderson 2004, p. iv). Plants in areas burned in 2002 displayed higher reproductive effort and vigor, and produced approximately 241 times more seeds per plant than did plants in unburned areas. It is likely that this resulted in part from depletion of pollinator resources in unburned areas, because the post-fire flush of growth attracted more pollinators. Plants in areas burned in

1996 on Park Mesa had very high vigor in 2003 (possibly due to high soil nitrate levels after fire) but did not set fruit although flowers were produced and insect visitation was observed (Anderson 2004, p. iv).

Seed bank studies for other Astragalus species indicate that the group generally possesses hard impermeable seed coats with a strong physical germination barrier. As a result, the seeds are generally long-lived in the soil and only a small percentage of seeds germinate each year (Morris et al. 2002, p. 30). However, we do not know if the seed germination strategy for other Astragalus species is comparable to that employed by Schmoll milkvetch.

The growth habit of Schmoll milkvetch suggests that it is tolerant of fire, with its deep taproot and shallowly buried root crown, to which the plant dies back during winter months. Plants can resprout following a low-intensity fire if the root crown is not damaged (Floyd-Hanna et al. 1997, 1998). Reproductive effort and fecundity were clearly higher in areas burned in 2002, and vigor also appeared to be greater..

Preliminary results from monitoring by CNHP in 2013 show an increase in density of Schmoll milkvetch on Chapin Mesa for the first time since 2002. The mean number of individuals per transect has been higher in the burned transects vs. unburned across 5 years of sampling. Continued monitoring will be needed to determine long term trends in the post-fire transects (San Miguel 2014, p. 1).

We conclude that the direct effects of fire on Schmoll milkvetch are both positive and negative. Plants burn to the ground and then resprout the following spring if the fire is not too intense, but then have competition from weeds and grasses. All of the burned and remaining unburned habitat on MEVE and the Tribal Park is at risk of burning within the foreseeable future. Although we remain concerned about the potential impacts of recurring fires, the best available information indicates that the direct effects of wildfires do not pose a threat to Schmoll milkvetch. However, the indirect effect of wildfire in facilitating invasion of the habitat by cheatgrass may pose a significant threat to the species (see Invasive Nonnative Plants for more discussion).

Invasive Nonnative Plants

As discussed above, the main threat to the species is the indirect effect of invasion by nonnative plant species (weeds). This invasion is facilitated by the increased frequency of burns as well as the clearing of areas within occupied Schmoll milkvetch habitat (CNHP 2006, p. 4). In MEVE, large wildfires that occurred earlier in the twentieth century (1934, 1959, 1972) were not associated with weed invasion (Floyd *et al*. 1999, p. 148), but the pinyon-juniper forests that have burned extensively in the past two decades are being replaced by significant invasions of weedy species, especially cheatgrass *(Bromus tectorum*), musk thistle (*Carduus nutans*), and Canada thistle (*Cirsium arvense* (Floyd *et al*. 2006, p. 1). Musk thistle was not found in either disturbed or undisturbed ground in 1980, but it was particularly invasive in burned areas of MEVE by 1999 and was aggressively invading areas occupied by Schmoll milkvetch (Floyd-Hanna *et al*. 1999, p. 148; Romme *et al*. 2003, p. 344).

Since 1996, MEVE has seen more large fires and more cumulative area burned than occurred during the previous 200 years (Romme *et al*. 2006, p. 3). This recent increase in fire activity is a result of severe drought conditions preceded by wet climatic conditions and increasing fuel load due to fire suppression in the pinyon-juniper woodlands, all coinciding with the natural end of a long fire cycle (Floyd *et al*, 2006, p. 247). A recent development in the post-fire habitat response is the remarkably rapid spread of cheatgrass. This weedy winter annual germinates in the fall, grows slowly during the winter, and then grows rapidly in the early spring. By early summer it has set seed and died, creating a continuous fuel bed of quick-drying, flashy fine fuel that can readily carry fire, even without wind. Cheatgrass has been in MEVE for many years. However, it was never widespread until 2000, when unusually warm dry summers and winters coupled with heavy fall rains allowed cheatgrass to rapidly expand its range, especially in places where fire or other disturbances have created bare ground (Romme *et al*. 2006, p. 3). Mature pinyon-juniper woodlands are highly vulnerable to post-fire weed invasion (Floyd *et al*. 2006, p. 254). Cheatgrass is now a dominant species in much of the area burned in MEVE (Romme *et al*. 2006, pp. 23) and it has inundated the burned

and disturbed portions of Schmoll milkvetch habitat on Chapin Mesa (Hanna *et al*. 2008, p. 18). The highest infestation occurred in an area that had burned both in the 1996 and the 2002 fires on Park Mesa. This had been an old-growth pinyon-juniper woodland before the 1996 fire, and was seeded with native grasses. After re-burning in 2002, this area was inundated by cheatgrass (Hanna *et al*. 2008, p. 9). Given the seasonal overlap of Schmoll milkvetch seedling growth with the peak growth of cheatgrass, it is likely that the presence of cheatgrass in populations of Schmoll milkvetch compromises its viability (Anderson 2004, pp. 6061).

Landscape modeling of the effects of projected cheatgrass increase on fire frequency in MEVE indicates the potential for frequent reburning. Projections show a fire rotation of about 45 years for MEVE. Such a frequent disturbance regime would be far outside the historical range of variability for the pinyon-juniper, and would likely impact or eliminate many native plant species (Turner et al., p. 40). We have no data to indicate whether Schmoll milkvetch will successfully adapt to a post-fire habitat of open clearings between shrubs, and competition from cheatgrass, thistles, and native grasses versus a pinyon-juniper dominated community.

In 1980, cheatgrass was found in 8 percent of survey samples in picnic grounds and 0 percent of undisturbed samples (Friedlander 1980, pp. 7576). We consider the invasion of nonnative weedy plants, particularly cheatgrass, to be a threat of high magnitude to Schmoll milkvetch because: (1) cheatgrass has invaded all of the burned and disturbed habitat of Schmoll milkvetch in MEVE, covering at least 40 percent of its entire range; (2) it competes with seedlings and resprouting adult plants for water and nutrients; (3) no landscape scale successful control methods are available; and (4) the proven ability of cheatgrass to increase fire frequency, thereby facilitating further rapid spread, threatens both burned and previously unburned occupied habitat. We conclude that cheatgrass invasion is likely to cause fire frequency to increase, with the result that only small patches of undisturbed habitat will remain for Schmoll milkvetch within MEVE. The extent of cheatgrass invasion on the Tribal Park is unknown, because no surveys have been completed.

Post-fire Mitigation

Various post-fire mitigation actions (aerial seeding of native grasses, and the control of weeds through mechanical removal, herbicides, and bio-control) have been effective in reducing the density of weeds after fire, but none of these techniques has prevented the weeds from becoming major components of the post-fire plant community. Post-fire mitigation activities were conducted in MEVE under the Burned Area Emergency Rehabilitation program in 1996 to 1997 to prevent weed invasion and severe erosion and to encourage native plant species. Aerial seeding of native grasses was applied intensively in the old-growth pinyon-juniper community. The density of musk thistle was significantly reduced by seeding in burned areas. There has been no evidence that the diversity of native forbs has declined by introducing native perennial grasses (Floyd *et al* . 1999, p. 155), but Schmoll milkvetch was not specifically monitored. Therefore, we are unsure if these efforts to prevent weed invasion negatively affect Schmoll milkvetch.

Seeding of native grasses has not prevented the spread of cheatgrass into burned areas. Despite the seeding, cheatgrass invasion has increased (Floyd *et al*. 2006, p. 254). Cheatgrass covered 23 percent of burned areas sampled in 2011 (Wender 2012, p.1). If cheatgrass continues to spread into recently burned areas in MEVE, it is likely to alter the previous regime of infrequent fires occurring during extremely dry periods to a new regime of frequent fires. Because the native flora is adapted to the historical fire regime, a change of this kind could produce rapid and irreversible degradation of native vegetation in the park (Floyd *et al*. 2006, p. 257). We believe this could be the case in Schmoll milkvetch habitat.

Releases of two biological control weevils on musk thistle have been highly effective in reducing the density, vigor, and net fecundity of the thistle plants in Schmoll milkvetch habitat on MEVE. Aerial seeding with native grass species has provided effective competition for some of the weeds and improved the proportion of native to invasive plants (Nelligan 2010, p. 2).

Post-fire weed control by aerial seeding of native grasses, mechanical removal, herbicides, and bio-control has reduced competition by invasive weeds other than cheatgrass, and there was little documentation of negative effects on Schmoll milkvetch, until 2011, when monitoring results showed that burned, seeded and unsprayed plots have significantly higher densities of Schmoll milkvetch than plots that were burned, seeded and sprayed (Kuhn and Anderson 2012, pp. 15, 28). Based on these results, we consider herbicide application to have a negative impact on the species. The impact does not rise to the level of a threat because applications were done in very limited areas, and park resource staff plan to minimize use of aminopyralid herbicides that affect milkvetch plants. The Natural Resource Program staff at MEVE hopes to develop an Invasive Plant Management Plan/Environmental Assessment and Biological Assessment which will include an analysis of impacts to Schmoll milkvetch from the preferred alternative. The most significant proposed change from current practice would be to allow for future emergency aerial application of pre-emergent herbicide (Imazapic) directed at stunting the establishment of cheatgrass after a future wildfire within the milkvetch habitat. The plan was expected to be completed before the 2014 field season, but has been postponed indefinitely.

Wildfire and Fuels Management

Wildfire management at MEVE includes the creation of fire breaks, fire lines, and staging areas, all of which remove the mature pinyon-juniper woodland habitat for Schmoll milkvetch. A cattle fence 4.2 km (2.6 mi) long separates the northern half of the species habitat on MEVE from the southern half on the Tribal Park. MEVE created a fire break about 30 m (100 ft) wide along this fence by cutting all vegetation to ground level. The break covers about 14 ha (34 ac), or 0.9 percent of the species total habitat, at the center of distribution for Schmoll milkvetch. On the Tribal Park side of the fence, the pinyon-juniper woodland is cut in a mosaic pattern, leaving trees and clumps of trees standing with cleared areas around them. This fire break covers about 189 ha (467 ac), or 12 percent of the species total range. Response of Schmoll milkvetch to the two different treatments has not been compared. Fire breaks also are created by prescribed burns. Mechanical removal and prescribed burning together have altered about 19 percent of the species total range, including the fenceline fire breaks described above (Nelligan 2010, p. 1). In 2011, a survey on the tribal fire break indicated the presence of foreign mulching materials, non-native seeded plant species, and feral horse bedding areas, all of which are habitat alterations likely to impede the regrowth of Schmoll milkvetch. Information on the status of Schmoll milkvetch within this area was not included in the survey report provided by the tribe (Natori 2012, p.1).

The ecological conditions for Schmoll milkvetch within the cleared areas are different from its typical pinyon-juniper woodland habitat. Cleared areas are exposed to more sun and wind that dry the soil and the Schmoll milkvetch seedlings. In addition to invasion by cheatgrass, removal of woody vegetation appears to result in competitive release of native grasses. In sites where no seeding has been done, removal of woody vegetation favors *Poa fendleriana* (muttongrass), the most common grass species on MEVE (Anderson 2004, p.73). This response is seen in mechanical fuels reduction areas on Chapin Mesa, where cover of muttongrass can approach 75 percent (Anderson 2004, p. 60). Density, reproductive effort and vigor of Schmoll milkvetch appears low in these areas, although there are few quantitative data with which to compare density. Plants were growing among large, crowded bunches of muttongrass and appeared small and unhealthy (Anderson 2004, p. 73). This effect is probably due to competition with muttongrass for water and nutrients. On unburned Chapin Mesa south of MEVE, density of Schmoll milkvetch was second only to muttongrass, as a dominant understory plant (Colyer 2002, in Anderson 2004, p. 7). This may indicate that Schmoll milkvetch can recover from the initial impact of native grass competition following removal of the overstory woodland.

Fuels management activities have direct and indirect impacts to Schmoll milkvetch plants and habitat. Fuels management activities occur in the summer and fall when impacts to mature Schmoll milkvetch plants are diminished or negligible because the seeds have matured and plants are dying back for the season. Direct impacts to the plants, such as trampling during the cutting and hauling out of wood and slash and scorching during prescribed burns, are short term because the plants will be able to resprout the following spring. Impacts to juvenile plants are not documented. Mechanical fuels reduction activities result in a low to

moderate level of surface disturbance, which we believe results in little direct impact to Schmoll milkvetch. However, the fuels management activities tend to facilitate nonnative species invasion by creating disturbance favored by these species. In addition to cheatgrass, musk thistle appears to thrive on the disturbance created by fuels management, and to outcompete Schmoll milkvetch (Floyd-Hanna *et al*. 1999). Numerous musk thistle plants were found in all areas visited where mechanical fuels reduction activities took place (Anderson 2004, p. 73.). The canopy of Schmoll milkvetch can act as a seed trap for musk thistle, which greatly increases the likelihood of negative impacts to Schmoll milkvetch from competition (Anderson 2004, pp. 63, 70).

Clearing for fuel reduction impacts Schmoll milkvetch in the following ways: (1) above-ground stems are directly removed; (2) plants that resprout the following spring have less water available because the soil dries due to exposure to sun and wind; and (3) invasive weeds, the native grass muttongrass, and seeded native grasses provide increased competition. However, we have no data that indicates the degree to which these impacts are occurring or will occur in the future. Because clearing and prescribed burns affect 19 percent of the range of Schmoll milkvetch, we believe that clearing or burning for fire management may have a detrimental effect on the species. As with wildfire, the indirect effect of facilitating invasion of the habitat by cheatgrass poses a threat to the species because it increases the likelihood of more frequent fires. Fuel reduction projects at MEVE during 2012 resulted in very little direct mortality of Schmoll milkvetch due to avoidance measures used by work crews (Wender 2012b, p. 2). In 2013, fuel reduction was conducted on 17 acres of occupied habitat. An unknown number of Schmoll milkvetch plants were cut because there was no time to flag them (San Miguel 2014, p.4).

A 2013 draft fire management plan recommends the widespread use of pile burning as the primary means of eliminating cut slash in fuel reduction areas, including Schmoll milkvetch habitat. The cutting and burning is expected to result in trampling of the milkvetch plants, disturbance of the soil, and an increase in invasive weeds. Park management is also considering a new helibase on Chapin Mesa at a location that would permanently impact some occupied habitat for the Schmoll milkvetch (San Miguel 2014, p. 7). Current fuels reduction activities are having a negative impact on the species, especially in the absence of a weed management plan, but the level of impact does not threaten the species overall.

Feral horse activity

Trespass by feral horses has created dirt trails and large patches of bare ground within Schmoll milkvetch habitat. These areas also serve as exotic species vectors. In MEVEs post-fire plant communities, non-native species are often present and sometimes dominate large areas. Horses create bare patches of disturbed soil, further encouraging the spread of weedy species such as musk thistle (*Carduus nutans*), alyssum (*Alyssum simplex*), and redstem storks bill (*Erodium cicutarium*) (San Miguel 2014, p. 1).

In 2011, most of the feral horses and cattle were removed from the park, but the practice was discontinued in 2013, so impacts from feral horses on Schmoll milkvetch will continue and expand in the coming years (San Miguel 2014, p. 7). However, at this time, the scope of these impacts is not large enough to be considered a threat to the species.

Development of Infrastructure

As of 1980, about 17.7 ha (44 ac) of Schmoll milkvetch habitat was graded or paved for roads within MEVE, which was 1.7 percent of the habitat known in the park at that time (Friedlander 1980, p. 78). As of 2010, about 36 ha (90 ac) or 4.5 percent of the known range of Schmoll milkvetch within MEVE was classified as hardened surfaces, i.e., roads, buildings, parking lots, water tanks, trails, etc. (Nelligan 2010, p.1). A recent impact was the installation of thousands of meters of underground fiber optic cables throughout the developed areas of the park (Anderson 2004, p. 70; Nelligan 2010, p. 2). Information on the number of plants destroyed or new recruits that appeared following the installation is not available (San Miguel 2010a, pers. comm.).

It is likely that a small percentage of the Schmoll milkvetch population has been eliminated during the development of visitor facilities in MEVE. Regular maintenance and construction projects at MEVE will continue to result in a small amount of plant mortality. Building modifications and utility upgrades in 2012 affected less than 0.04 ha (<0.1 ac) and an estimated maximum of 50 plants. Most of the plants within project areas were flagged and avoided (Wender 2012b, p.2). Trampling of plants by people using trails, roads, and picnic areas in the developed portion of MEVE also eliminates a small number of plants (Nelligan 2010, p.2). Likewise on the Tribal Park, most foot traffic is limited to routes used by escorted tour groups and, therefore, likely to have a very small impact on the species.

Trampling of plants by visitors and staff is an ongoing impact that does not rise to the level of a threat because it affects plants in a very limited portion of the species range in MEVE and in the Tribal Park. Schmoll milkvetch may recover from this kind of disturbance if the below-ground parts are not damaged, or if undamaged plants remain nearby to provide a seed source and the disturbance is not constantly repeated or followed up with additional disturbances. One attempt to transplant mature plants that were growing in a planned construction area was unsuccessful because the taproots were severed (Nelligan 2010, p. 2)

Construction of new roads, a visitor center, and campground in MEVE occurred in 2010. Most of the new construction was outside of Schmoll milkvetch habitat. Most of the disturbance in occupied habitat was related to a water pipeline, and because it was directionally drilled from one pad of about 4 by 24 m (14 by 80 ft) alongside the park road, the impact on the plants was negligible (San Miguel 2010b, pers. comm.).

The habitat for Schmoll milkvetch on tribal land is within the Tribal Park, which is managed for protection of its cultural and natural resources. It is an undeveloped area without surfaced roads or permanent facilities. We are not aware of any development activities on the Tribal Park that would impact Schmoll milkvetch (Mayo 2010, pers. comm.).

Overall, the impact of existing development appears low, impacting about 2.3 percent of the species entire range. MEVE will likely continue to locate major facilities outside of Schmoll milkvetch habitat, and minimize infrastructure within the habitat in the future. Most of the habitat within MEVE is protected from development, because it is within a National Park. Likewise, the Tribal Park is likely to remain undeveloped (Mayo 2010, pers. comm.). Therefore, development does not appear to constitute a threat to Schmoll milkvetch now, nor is it likely to in the foreseeable future.

Drought and Climate Change

Drought may negatively affect Schmoll milkvetch. In 2002, severe drought caused most Schmoll milkvetch individuals to remain dormant (Anderson 2004, p. 4). The total annual precipitation measured at MEVE in 2002 was 28 cm (11 in.), well below the average of 44 cm (17.5 in.) for 1948 to 2003. However, there were 5 years between 1948 and 1989 in which MEVE received less than 28 cm (11 in.) of precipitation. Tree ring analysis indicates that droughts were as common during the Ancestral Puebloan occupation of MEVE, from approximately *A.D. 600* to *A.D. 1300*, as they are today. It is likely that drought is common enough that Schmoll milkvetch *can* recover from its effects (Anderson 2004, p. 35), provided that severity and duration of drought does not exceed historical levels, or that threats such as weed invasion do not increase significantly as a result. Periodic drought causes Schmoll milkvetch plants and seedlings to dry out during a given year, and contributes to increased fire frequency and weed invasion. We believe that drought has a low-level direct impact on the species. It also indirectly facilitates cheatgrass invasion and increased fire frequency and therefore is a threat to the species.

Our analyses under the Endangered Species Act include consideration of ongoing and projected changes in climate. The terms climate and climate change are defined by the Intergovernmental Panel on Climate Change (IPCC). Climate refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007, p. 78). The term climate change thus refers to a change in the mean or variability of one or

more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007, p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, depending on the species and other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (IPCC 2007, pp. 814, 1819). In our analyses, we use our expert judgment to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

Climate change projections for the Southwestern United States include increased temperatures, more intense and longer-lasting heat waves, and an increased probability of drought, that are worsened by higher temperatures, heavier downpours, increased flooding, and increased erosion (Karl *et al*. 2009, pp. 129134). Projections for western Colorado indicate that temperature could increase an average of 2.5 °C (4.5 °F) by 2050 (UCAR 2009, pp. 1-14).

The increasing frequency of large-scale fires is largely due to periodic drought conditions preceded by years of wet climatic conditions that allowed heavy fuel loads to accumulate (Floyd *et al*. 2006, p. 247). The occurrence of this specific combination of a wet season followed by drought, which is likely to be exacerbated by climate change, is unpredictable at this time. We expect that Schmoll milkvetch will be affected negatively by the effects of climate change on precipitation, but the available information is too speculative to conclude that those impacts would rise to a level that would constitute a threat to the species.

Summary of Factor A

The highest threat to Schmoll milkvetch habitat is still the invasion of nonnative cheatgrass following wildfires, prescribed fires, and fire break clearings. Recent wildfires have burned 21 percent of the pinyon-juniper woodland habitat for the species. Another 19 percent has been burned and/or cleared to discourage further spread of wildfires within MEVE. Dense stands of cheatgrass have invaded all of these areas, which cover 53 percent of the habitat on MEVE, 40 percent of the entire range of the species. Cheatgrass is highly flammable and greatly increases fire frequency on both burned and nearby unburned but disturbed habitat. Although mature Schmoll milkvetch plants recover strongly after fire, cheatgrass competes with seedlings for water and nutrients, and we are unsure of their long-term reproductive success in open areas exposed to drying sun and wind. Cheatgrass covered 23 percent of sampled post-fire habitat in 2011 (Wender 2012a, p.1). Frequent fires are likely to prevent recovery of the pinyon-juniper woodland. There are no landscape-scale methods known to be effective in controlling cheatgrass. Therefore, we consider the dominance of cheatgrass in occupied Schmoll milkvetch habitat to be a significant threat to the long-term survival of the species. No wildfires occurred within Schmoll milkvetch habitat on MEVE in 2012 or 2013, but wildfires, prescribed fires, and clearings for fire breaks are still considered a moderate threat to the species because they destroy plants, modify the habitat and facilitate the invasion of cheatgrass.

Drought facilitates increased fire frequency and, therefore, is found to be a threat to the species. Climate change may exacerbate the threat of cheatgrass invasion and more frequent wildfires, but we cannot foresee whether its effects are likely to threaten the continued existence of Schmoll milkvetch.

The impact of infrastructure development and visitor use is low. About 36 ha (90 ac) of Schmoll milkvetch habitat on MEVE have been used for roads, buildings, parking lots, etc., which is 2.3 percent of the species entire range. No permanent development has been reported on the Tribal Park. Existing and foreseeable future development is considered a minor impact that does not threaten the continued existence of the species.

Post-fire weed control by aerial seeding of native grasses, mechanical removal, herbicides, and bio-control has reduced competition by invasive weeds *other than cheatgrass*, and there is little documentation of negative effects on Schmoll milkvetch other than from the ingredient aminopyramid. We consider the impacts of these activities to be low, not rising to the level of a threat to the species.

Habitat disturbance by feral horses results in impacts that are limited in scope, and do not rise to the level of a threat to the species.

We find that Schmoll milkvetch is threatened by the present or threatened destruction, modification, or curtailment of the species habitat or range, and these threats are expected to continue or increase in the foreseeable future.

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

We are not aware of any threats involving the overutilization or collection of Schmoll milkvetch for any commercial, recreational, scientific, or educational purposes. Therefore, we do not consider overutilization to be a threat to the species now, nor is it expected to become so in the foreseeable future.

C. Disease or predation:

Herbivory and trampling

Herbivory by trespass horses and mule deer was frequently observed early in the 2011 season (Wender 2012a, p. 1).). During the 2011 and 2012 field seasons, many Schmoll milkvetch plants were nipped off in areas with heavy horse trampling (San Miguel 2014, p. 1). Feral horses and stray cattle graze within the species range, including the burned areas. Mature plants usually resprout the following spring after browsing by animals (Nelligan 2010, p. 1).

The most abundant grass (muttongrass) associated with Schmoll milkvetch on the Tribal Park is highly palatable to cattle, which graze the grass in preference to the milkvetch. Grazing therefore does not appear to be an issue in the southern portion of its range.

Seed predation by snout beetles or weevils caused loss of seeds in about 12.5 percent of Schmoll milkvetch plants in plots sampled in 1980 (Friedlander 1980, p. 64). Beetle predation has not been observed again since 1980, and is not considered a threat to the species. Anderson (2001, p. 11) reported severe defoliation of Schmoll milkvetch by larvae of the clouded sulfur butterfly (*Colias philodice*). Aphids also appeared to have an impact on reproductive output for this species (Anderson 2001, p. 11). In addition, about 10 percent of the large multi-stemmed plants observed in 2012 within the burned area on Chapin Mesa were damaged by unidentified insect larvae that caused stems to weaken and break (Wender 2012b, p.1). However, these events were unusual, and insect predation is considered a low-level impact that does not rise to the level of a threat.

No diseases are known to affect Schmoll milkvetch. Therefore, we do not consider disease to be a threat to the species.

Summary of Factor C

With the current and anticipated increase in trampling and herbivory by feral horses and cattle, herbivory is considered a low level threat to the species.

No diseases are known to affect Schmoll milkvetch.

D. The inadequacy of existing regulatory mechanisms:

The species is offered some protection based on its presence within a National Park. The National Park Service Organic Act (1916, p. 1) states that wildlife are to be conserved and left unimpaired for future generations to enjoy. The MEVE mission is to preserve and protect more than 4,000 archeological sites and also to protect wildlife, birds, and other natural resources from willful destruction, disturbance, and removal

(National Park Service 2010, p. 1). The plants are protected from visitor impacts in undeveloped areas of MEVE by regulations that restrict visitor access to designated trails, roads, and campgrounds to protect cultural resources. Visitors found hiking off developed areas or designated trails when not accompanied by a uniformed National Park Service employee are subject to penalties provided for in title 36 of the Code of Federal Regulations (maximum fine of $500 and 6 months imprisonment). MEVE does not have a management plan specific to Schmoll milkvetch, nor do their draft fire management plans or draft weed management plans specifically mention management for this species (San Miguel 2010a, pers. comm.). However, these draft plans include rare plant surveys and avoidance (Nelligan 2010, p. 4.). MEVE gives Schmoll milkvetch special consideration when planning park projects in an effort to minimize impacts to the species (Nelligan 2010, p. 3). During 2011 and 2012, management for Schmoll milkvetch included plant surveys and mapping, avoidance and minimization of habitat disturbance during work projects, tracking of plants that were impacted, long-term population trend research, exotic plant control, and trial application of Plateau herbicide to control cheatgrass (Wender 2012b, pp. 2-3).

The habitat for Schmoll milkvetch on the Tribal Park is maintained as part of a 50,586-ha (125,000-ac) undeveloped area to protect cultural and environmental resources. Visitors are allowed only on guided tours. The management goal for Schmoll milkvetch occupied habitat is for no ground-disturbing activities. Grazing is allowed (Clow 2010, pers. comm.), but we do not believe it substantially impacts the species.

The Ute Mountain Ute Tribe has been drafting a management plan for species at risk that is to include monitoring of Schmoll milkvetch plants and habitat (Clow 2010, pers. comm.). The management plan will assist us in better understanding the extent to which the Tribe plans to conserve the species and its habitat, but the final plan is not yet available.

Despite the positive management for Schmoll milkvetch that occurs within MEVE and the Tribal Park, the existing regulatory mechanisms cannot control the primary threats from cheatgrass and other fire effects on such a large scale. Therefore, the existing regulatory mechanisms are not adequate to protect or recover the species.

Summary of Factor D

We expect that Schmoll milkvetch habitat on the Tribal Park is generally protected from human disturbance by tribal regulations that do not allow public access or unauthorized activities. Human impacts in undeveloped areas of MEVE are minimized by regulations that restrict visitor access to designated trails, roads, and campgrounds to protect cultural resources. While currently needed management actions are ongoing and management plans have been drafted, no plans, policies, or regulations have been signed and implemented for the specific purpose of monitoring and protecting Schmoll milkvetch from cheatgrass invasion and recurrent fires. We anticipate that MEVE and the Ute Mountain Ute Tribe will formalize their management plans at some future time.

The existing suite of local, State, and Federal laws that we evaluated do not address the primary threat to Schmoll milkvetch of cheatgrass invasion following fire. Additionally, the existing plans rely on the resilience of the plants and their ability to resprout after impacts, which is insufficient to provide for their recovery post-fire. Therefore, we find that the existing regulatory mechanisms for the species are inadequate and do not address the threats to the continued existence of the species.

E. Other natural or manmade factors affecting its continued existence:

Restricted Range

The global range of Schmoll milkvetch is restricted to pinyon-juniper woodlands on about 1,619 ha (4,000 ac) on 3 adjacent mesas. It does not grow in grasslands below the mesas or in adjacent shrublands at higher elevation on the mesas, nor has it been found in pinyon-juniper woodlands on nearby mesas. Such a restricted

range makes the species vulnerable to habitat modification caused by wildfire, cheatgrass invasion, increased drought, and climate change, but is not considered a threat in itself.

Herbicides

Less than 10 percent of Schmoll milkvetch habitat on MEVE has been sprayed with herbicide to control identified high-density stands of Canada thistle. These herbicide applications have been performed carefully to minimize overspray that might land on native species (Nelligan 2010, p. 2). We are not aware of any use of herbicides on the tribal land habitat. Prior to 2011 we had no information indicating that herbicide use has affected Schmoll milkvetch, so we did not consider herbicide use to be a threat to the species. However, a report on monitoring conducted in 2011 shows a significantly higher density of Schmoll milkvetch in post-fire areas that were seeded but not sprayed compared to post-fire seeded areas that were sprayed (Kuhn and Anderson 2012, pp. 6, 15). These results introduce uncertainty about the level of impact caused by herbicides.

Summary of Factor E

The small range of Schmoll milkvetch makes it vulnerable to existing and future threats, but does not constitute a threat in itself. Herbicides are used within the habitat, but prior to 2011 they were not known to affect the species. Herbicide use occurs in a small portion of the species habitat and is conducted so as to minimize impacts to the species. However, we are not certain at this time whether impacts from herbicides rise to the level of a threat that may affect the continued existence of the species.

Conservation Measures Planned or Implemented :

Exotic Plant Control

Musk thistle, Canada thistle, and other invasive exotic plants will be spot treated within portions of Schmoll milkvetch habitat in MEVE. Efforts will concentrate on roadsides, trail corridors, developed zones, and small burn areas on Park Mesa and Chapin Mesa. Work will primarily be done with backpack sprayers, using aminopyralid (roadsides only) and glyphosate herbicides (Wender 2011, p.2; 2012a p. 4). Additional care will be taken when applying herbicides with the active ingredient aminopyralid, which is highly active on plants in the Fabaceae family. Use of this herbicide within Schmoll milkvetch habitat will be minimized, except immediately along roadsides.

The MEVE Invasive Exotic Plant Management Plan calls for the aerial application of imazapic herbicide (e.g., Plateau®) following severe wildfires in sites with moderate to heavy cheatgrass infestations. In order to clarify the potential effects of aerial Plateau® applications on Schmoll milkvetch, MEVE conducted an herbicide trial in fall of 2011. The trial was designed to replicate the application timing, herbicide rate, and broadcast pattern that would most likely occur under an operational aerial cheatgrass treatment scenario. They applied 8 oz/ac of Plateau® with a calibrated CO2-powered backpack sprayer to six 0.01-acre rectangular plots within known patches of Schmoll milkvetch. Three plots were treated on September 21, 2011. The remaining three plots were treated on October 11, 2011. Plots were examined in spring and fall of 2012 to assess Schmoll milkvetch mortality, foliar yellowing, growth, flower production, and seed production. There was no apparent herbicide damage on any milkvetch species plants in any treatment plot in 2012. Live cheatgrass cover declined in all plots, including the control plot one year after treatment. Herbicide treatment effects on cheatgrass were obscured by lack of late-season germination due to low precipitation in late summer (Wender 2012b p. 3). It was planned that pending the final results of this trial, aerial Plateau® applications would be prohibited within Schmoll milkvetch habitat. After the trial had concluded, a determination would be made about the effects of aerial herbicide applications. Data from the 2011 Schmoll milkvetch population status survey and previous surveys in 2001 and 2003 would be used to

develop a threshold of acceptable Schmoll milkvetch injury and mortality resulting from herbicide application (Wender 2012a, p.3). However, this herbicide plan was discontinued in 2013 until the vegetation ecologist position at MEVE can be filled.

Summary of Threats :

Table 1 below provides an overview of the threats to Schmoll milkvetch. We consider degradation of habitat by fire followed by cheatgrass invasion and subsequent increase in fire frequency to be the most significant threats (Table 1). Cheatgrass is likely to increase given its rapid spread and persistence in habitat disturbed by wildfires, fire and fuels management and development of infrastructure, and the inability of land managers to control it on a landscape scale. Threats to Schmoll milkvetch and its habitat from nonnative plant invasion following wildfires and fire and fuels management currently affect about 53 percent (431 ha (1,066 ac)) of the species range on MEVE and 26 percent (212 ha (524 ac)) on the Tribal Park for a total of 40 percent of the species entire known range (Table 8). Fires, fire break clearings, and drought are considered moderate threats to Schmoll milkvetch. Regulatory mechanisms continue to be inadequate to protect the species from these threats, and this has a moderate impact on the species. Other impacts not considered threats include post-fire native grass seeding, thistle invasion, aminopyralid herbicide use, infrastructure development, trampling and herbivory by feral horses, and pollinator availability.

An update on the status of Schmoll milkvetch on Ute Mountain Ute tribal land was not made available to us in 2014.

TABLE 1. Threat summary for factors affecting Schmoll milkvetch.

Listing Factor	Threat or Impact	Scope of Threat or Impact	Intensity	Exposure %	Likelihood of Exposure	Species' Response	Foreseeable Future	Overall Threat
A	Native Grass Seeding Post-fire	Moderate	Low	21	High	Competition	Continue	None
B	None			0			Not likely to change	None
C	Herbivory	Low	Low	1	low	Plants resprout, seedlings destroyed	Likely to continue & fluctuate with feral horse population	None
C	Chemical & Mechanical Weed Treatment	Low	Low	7	Moderate	Some mortality, strong regrowth by survivors	Continue	None
D	National Park Laws & Regulations	Moderate	Moderate	50	Moderate	Plant mortality	Stronger protection	Moderate
D	Tribal Laws & Regulations	Moderate	Moderate	50	Moderate	Unknown	Increase management actions	Moderate
E	Limited Range	High	Low	100	High	No range expansion	Increased effect with drought & climate change	None
E	Pollinator Availability	Low	Low	22	Low	Decreased seed production	Increase with fire	None

Listing factors include: (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. "?" indicates significant uncertainty.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

We recommend:

-continued implementation of the plans for cheatgrass control, monitoring population trends in response to fire management, invasive species, and tracking of development impacts that are now being conducted by MEVE;

-additional plant surveys to document the entire range of the species on MEVE and Tribal lands;

-removal of feral horses from MEVE;

-avoidance of impacts to the plants during ground disturbing activities within MEVE.

Planning, Management, and Conservation:

The permanent vegetation ecologist position at MEVE was vacated in November of 2012, and has remained vacant since then. This critical position held primary responsibility for investigating and tracking impacts and findings regarding Schmoll milkvetch, including studying the effects of imazapic herbicide on and developing a Conservation Plan for this species. The Natural Resource Program manager and seasonal work

crews attempted to fill some of these functions. However, the Conservation Plan is on permanent hold and the imazapic study cannot be restarted to test higher concentration dosing unless a replacement is authorized, hired, and retained (San Miguel 2014 p. 8.)

Additional appropriate conservation measures for this candidate species will depend on the results of ongoing research regarding effective measures for controlling cheatgrass and other invasive species that are competing with Schmoll milkvetch on MEVE.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8**
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Magnitude:

Moderate. We consider the threats that Schmoll milkvetch faces to be moderate in magnitude because the major threats (weed invasion facilitated by fire, management of fire and fuels management, and drought, plus inadequacy of existing regulatory mechanisms), while serious and occurring rangewide, do not collectively rise to the level of high magnitude. For example, the last known populations are not about to be completely lost due to the effects of wildfires.

The magnitude of threat Factor A is considered moderate because about 40 percent of Schmoll milkvetch habitat has been modified by fires and fire-related activities, followed by unprecedented invasion by cheatgrass, facilitated by drought. The threats in Factor A are shown to have occurred in the past, and are clearly a threat today and into the future. These impacts affect the competitive ability and reproductive success of Schmoll milkvetch individuals, and increase the likelihood of more frequent fire intervals in the future.

The magnitude of threat Factor D is considered moderate. No plans, policies, or regulations have been signed and implemented for the purpose of monitoring and protecting Schmoll milkvetch from cheatgrass invasion, recurrent fires, or fuels reduction activities. MEVE and the Ute Mountain Ute Tribe have not implemented management plans that include Schmoll milkvetch.

Imminence :

Imminent. 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 and D of this finding. All of the threats are ongoing and, therefore, imminent, although the likelihood of exposure varies (Table 1). In addition to their current existence, we expect these threats, except for inadequate regulations, to continue and likely intensify in the foreseeable future.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

We believe that there are enough occurrences of Schmoll milkvetch and the threats are not so immediate or of high enough magnitude to warrant emergency listing.

Description of Monitoring:

Starting on January 1, 2011, MEVE began closely tracking disturbances from facility and utility construction and maintenance within Schmoll milkvetch habitat. Tracking is focused on disturbance events that displace soil, potentially damaging below-ground perennial plant structures, and disturbance events that will permanently harden ground surfaces, thereby preventing plant growth or colonization. Prior to disturbance, project sites are examined to determine if Schmoll milkvetch plants are present. The number of plants observed within the project site is recorded and mitigation measures are recommended. When projects occur outside of Schmoll milkvetch growing season (when plants cannot be identified), the area of disturbance is multiplied by the 2003 population density estimate of 0.037 plants/m2 to calculate the potential number of plants disturbed by the project (Wender 2011, pp. 2-3).

Because this species distribution in the park has been mapped and sampled extensively by CNHP, the parks Natural Resource staff does not deliberately survey for this species; however, some new occurrences are found incidentally. New locations for small numbers of plants were found in 2012 and 2013 on the sides and bottom of canyons below Chapin Mesa, showing that the species is not entirely limited to mesa tops (Wender 2012b, p.1; San Miguel 2014, p.1). Preliminary data suggest that Schmoll milkvetch populations increased slightly from 2011 to 2012.

Demography plots at MEVE were sampled at Sun Point, Sun Temple, and West Chapin Spur in 2012 and 2013; and long term population trend data were collected in 2001, 2003, 2011, 2012 and 2013 (Wender 2012b, p. 2; San Miguel 2014, p.2). The population density level in transects on Chapin Mesa rose for the first time in 2013, from the 2012 level of 0.036 plants per square meter to 0.08478 plants per square meter (San Miguel 2014, p. 2).

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

Colorado

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

Colorado Natural Heritage Program conducted monitoring and provided updated element occurrence records and element global and state ranking forms.

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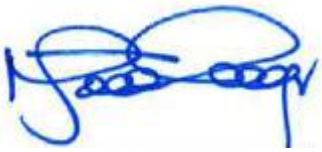
Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  06/02/2014
Date

Concur:  11/18/2014
Date

Did not concur: _____ _____
Date

Director's Remarks: