

Status Report

Mancos milkvetch (*Astragalus humillimus*)

BLM Hogback ACEC

2020



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for the

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INTRODUCTION

Mancos milkvetch (*Astragalus humillimus* A. Gray ex Brand) is only known from the Four Corners region of New Mexico and Colorado. The species is a member of the Colorado Plateau ecoregion, one of eight ecoregions represented in the state of New Mexico (Griffith et al. 2006, Level III). It occurs primarily on Navajo Nation lands, with small populations on Bureau of Land Management and State Trust lands in New Mexico, and Ute Mountain Ute tribal lands in southwestern Colorado.

Mancos milkvetch was listed endangered under the federal Endangered Species Act on June 27, 1985 (50 FR 26568-26572). Primary reasons for listing included a very limited distribution combined with low disturbance tolerance, and close proximity to powerline corridors, roads, and oil wells (energy development). A recovery plan to guide recovery efforts was completed in 1989 (USFWS 1989). In addition, Mancos milkvetch is listed endangered by the state of New Mexico and the Navajo Nation. The species is assigned a low overall conservation rank of 'under conserved' by the New Mexico Rare Plant Conservation Strategy due to moderate to high levels of documented threats, documented population declines and limited distribution (EMNRD – Forestry Division 2017).

Habitat

Mancos milkvetch grows only on rimrock outcrops of the Point Lookout member of the Mesa Verde series of sandstone with flat or gently sloping surfaces at elevations between 5,200 and 6,000 feet. Within this range the species is confined to large sloping sheets of exfoliating whitish-tan colored sandstone. In San Juan County, New Mexico, this habitat extends southward from the Colorado border to about 23 miles south of Shiprock near Little Water. The total range of the species is approximately 30 miles x 15 miles.

Mancos milkvetch is usually found on large nearly flat sheets of sandstone in small depressions (tinajas) on bedrock, in cracks or fissures in sandstone, or at the base of gentle slickrock inclines. Within its restricted range Mancos milkvetch forms highly localized populations; occupied habitat ranges from 1.5 to 7.6 hectares in size, where plants could historically be concentrated in densities as high as 40 plants per square meter (Sivinski 2008). The density within populations can vary dramatically, depending on rainfall and habitat suitability (Sivinski 2008).



Figure 1. Mancos milkvetch crack habitat at the BLM Hogback ACEC

Thirteen population sites were identified in the 1989 recovery plan (USFWS 1989). Only 3 additional population sites have been found since, all on the Navajo Nation. Population estimates in the recovery plan ranged from 50 plants at Tanner Mesa on Ute Mountain Ute lands in Colorado to 8,000 plants at South Long Point on the Navajo Nation in New Mexico. Ten of the 13 sites recorded 500 or more plants per site. Only one of 11 sites surveyed on the Navajo Nation had more than 500 individuals in 2017 (Talkington 2019). The largest and best known site is Slickrock Flats on the Navajo Nation (and partial BLM), where the population was estimated at over 9,000 individuals in the 1989 recovery plan (Slickrock Flats A & B; USFWS 1989).

Currently sixteen population sites are known to occur in New Mexico (14 on the Navajo Nation, 2 inside the BLM Hogback ACEC on State Trust and BLM lands) and four populations in adjacent Colorado (Talkington 2019, USFWS 2011).

Population Trend Monitoring

Two long term population trend monitoring sites have been established for Mancos milkvetch within the BLM Hogback Area of Critical Environmental Concern (ACEC), located on NM State Trust lands (Sleeping Rocks) and lands managed by the Bureau of Land Management (Slickrock Flats). Both sites have been monitored by the NM Forestry Division since 1990 (Roth 2020). Five monitoring plots were established at each location and are monitored during the first 2 weeks of June, annually between 1990 and 1999, in 2002 and 2008 and biennially since 2014.

The Navajo Natural Heritage Program has performed several status surveys and established monitoring plots at 7 sites in 2019 (Roth 2008, Talkington 2019). Status surveys of Navajo Nation sites and population trends recorded in the ACEC monitoring plots since 1990 have documented significant rangewide declines (Figures 2 & 3).

Individual plants convalesce into clumps over time and it becomes difficult to discern individuals. Therefore, in addition to counting the number of adult plants, the cover of adult plants is measured to estimate the overall health of a population. Although overall plant cover can differ significantly between monitoring years depending on rainfall, the cover of live plants has steadily decreased since 1990 in the 10 monitoring plots within the ACEC (Figure 2).

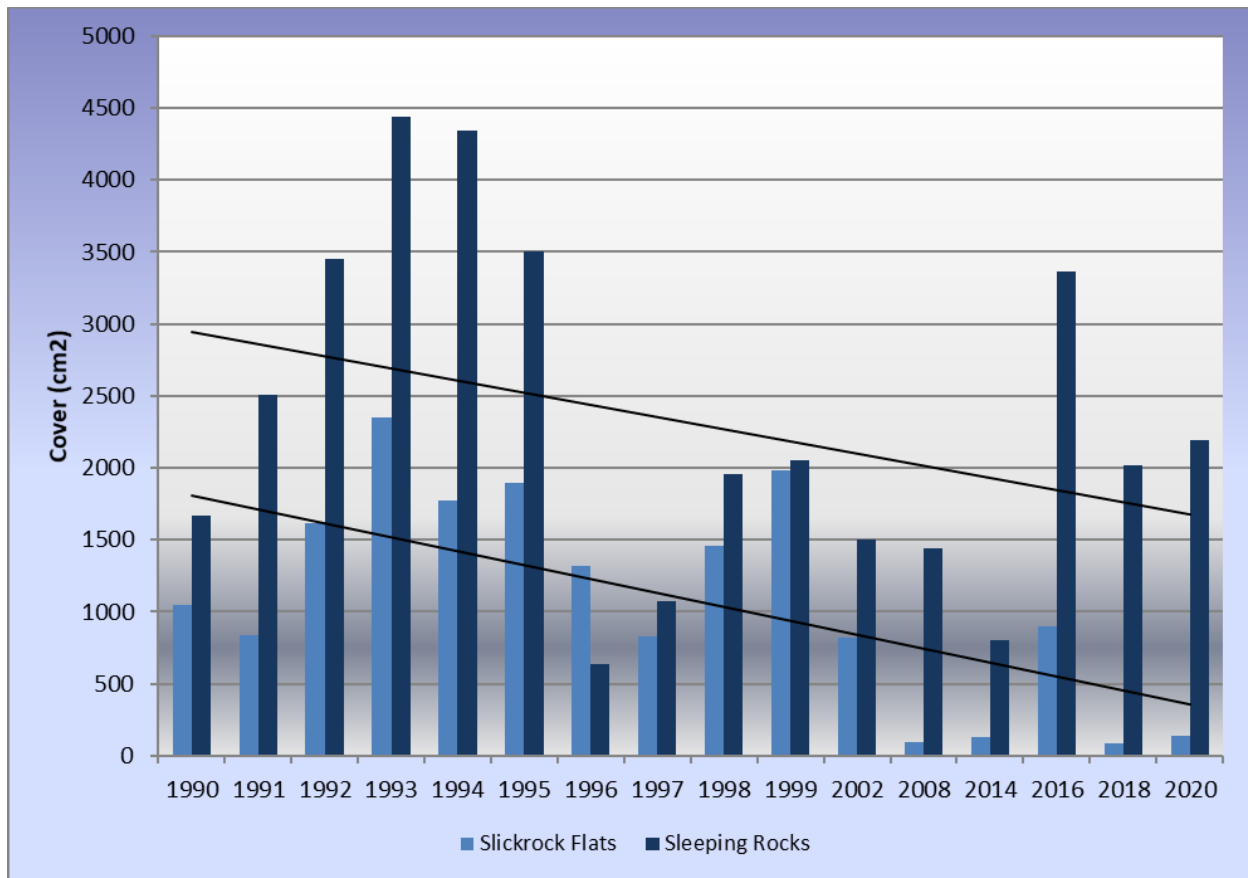


Figure 2. Population trend for Mancos milkvetch at 2 monitoring sites within the BLM Hogback ACEC since 1990, as indicated by changes in plant cover through time (Roth 2020).

This decline is supported by the number of seedlings found within the 10 monitoring plots over time. Over the past 2 decades only one of 6 monitoring years documented a significant number of seedlings (Figure 3).

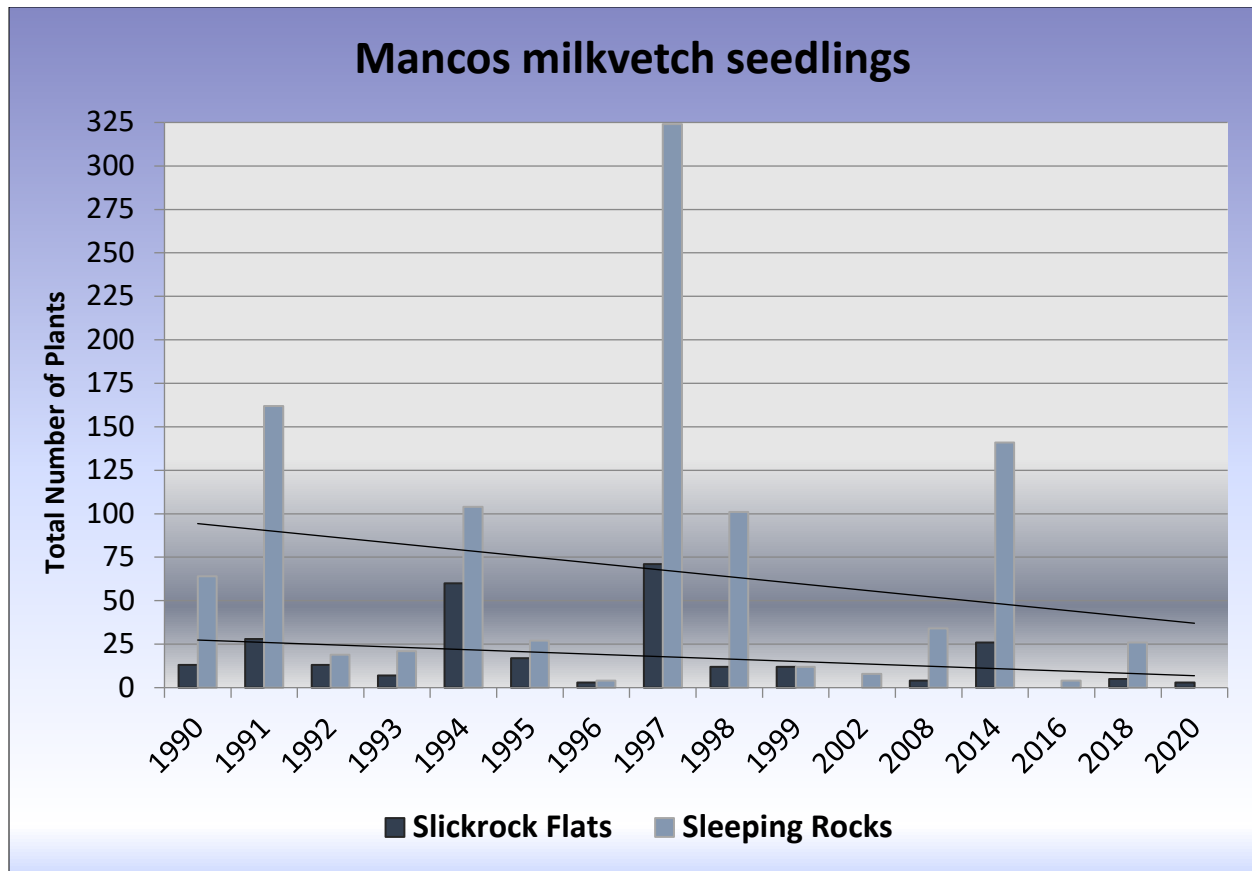


Figure 3. 30-year population trend for Mancos milkvetch seedlings at 2 monitoring sites within the BLM Hogback ACEC since 1990 (Roth 2020).

BLM Hogback Area of Critical Environmental Concern (ACEC)

The Farmington BLM designated the Hogback ACEC in their 1988 Resource Management Plan for the purpose of conserving two federally listed plant species, Mesa Verde Cactus (*Sclerocactus mesae-verdae*) and Mancos milkvetch, and several other rare or endemic plant species (BLM 1988). It is considered an important area of both regional and national significance for conservation and the study of rare plants. All known populations of Mancos milkvetch outside tribal lands are located within the ACEC boundaries, on BLM and State Trust lands. The ACEC is divided into 2 parcels, with the larger primary parcel located just north of Waterflow, NM, and a smaller disjunct section approximately 1.5 miles north of the primary parcel (Figure 4).

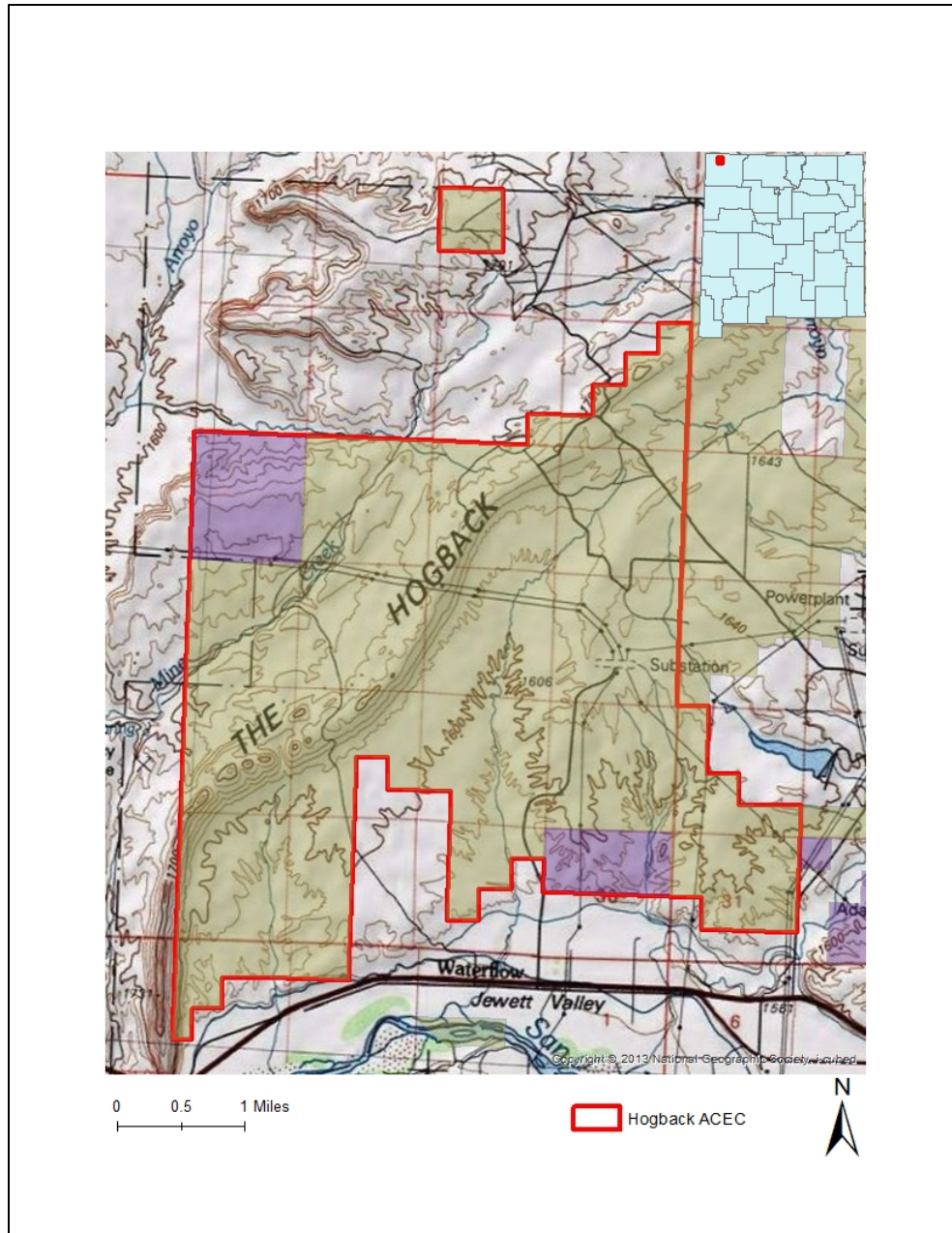


Figure 4. BLM Hogback ACEC boundaries. Purple colored sections are State Trust lands.

ACEC designation was carried forward in the updated 2003 Farmington Resource Management Plan, with some changes to management prescriptions (BLM 2003). The 2020 draft amendment to the Resource Management Plan does not propose any changes to the ACEC (BLM 2020). The current ACEC boundary contains 10,367 acres including 960 acres of State Trust lands managed by the State Lands Office. The main management objective of the special management area is to meet BLM responsibilities under the Endangered Species Act to protect the habitat of threatened, endangered, proposed, or other sensitive species.

Current management prescriptions are

1. Manage existing oil and gas leases under Controlled Surface Use constraint.
2. Discretionary closure on new oil and gas leasing.
3. Close to all other forms of mineral entry.
4. Acquire non-federal minerals.
5. Acquire non-federal inholdings and acquire easements.
6. Land ownership not available for disposal.
7. ROWs permitted on a case-by-case basis with special management constraints and mitigations.
8. OHV limited to existing roads and trails.
9. Designate as Class II, III VRM Area.
10. Close to wood cutting and gathering except for administrative purposes with approval of wildlife staff.
11. Apply limited fire suppression and include invasive weed management.
12. Open to grazing permits.
13. Continue monitoring on regular basis. Develop activity plan as part of area-wide rare plant Habitat Management Plan
14. Apply limited fire suppression



METHODS

Outside regular monitoring, no status surveys had been conducted for the Mancos milkvetch populations inside the ACEC since it was established. Hence the 2020 surveys focused on surveying all potential habitat within the ACEC and specifically assessing the current status of the Slickrock Flats and Sleeping Rocks populations within the ACEC boundaries. Surveys were performed by one person during the first 2 weeks of April 2020, during flowering season for the milkvetch to optimize detection. Target survey areas were in the vicinity and at historic mapped points and the other areas providing suitable habitat within the ACEC boundaries. Survey routes were documented using the tracking function of a Garmin Monterra GPS. Waypoints and associated data were collected with a Samsung Galaxy S2 tablet using the Collector App. At each waypoint the number of live plants, including seedlings, were counted within a crack or a tinaja. The number of dead plants was also noted. Additional information was collected on the vigor, reproductive status and observed disturbances associated with the general area of

occupation. Historic locations and associated data were provided by the BLM and the NM Natural Heritage Program. Outside of the original 1989 recovery plan population estimates, plant abundance within the 10 monitoring plots at the 2 monitoring sites, no specific information on abundance was available for data points provided by the BLM and Heritage Program, which provided just a very general location of historic locations. No population boundaries or maps were provided in the recovery plan and location information provided by the BLM was point data. Surveys were restricted to all suitable and potential habitat within the Hogback ACEC and specifically to areas surrounding the Slickrock Flats/North Long Point and Sleeping Rocks populations.

The recovery plan divides the Slickrock Flats populations into 2 locations Slickrock Flats A (estimated at 7,699 individuals) and in Slickrock Flats B (1,600 plants). Both are located primarily in T30N R16W S2, and some in the adjacent Section 11, on BLM and tribal lands. In addition, the North Long Point population (500 individuals) is described from the same Section (T30N R16W S2) and is adjacent to the Slickrock Flats A population. It is unclear how populations were delineated in the recovery plan. For example, the 2 Slickrock Flat sites, the West Rim site, and the 2 Long Point populations form likely 1 biological population based on their proximity to each other and available suitable habitat. For the purpose of this study surveys were restricted to BLM lands within the ACEC boundaries and included at least in part the Slickrock Flats A and North Point populations.

The Sleeping Rock area is more defined on the ground and the recovery plan estimated the number of plants at 552 individuals on State Trust lands including 70 in the vicinity of transmission lines and a transmission tower on BLM lands.

RESULTS

A total of 326 live and Mancos milkvetch plants were found inside the ACEC at 2 general locations (Slickrock Flats/North Long Point and Sleeping Rocks).

Extensive searches on suitable habitats in the northernmost section of BLM managed lands of the Slickrock Flats and North Long Point populations documented 208 live plants from 39 waypoints, including 21 seedlings. Approximately 75% of the 39 waypoints had flowering plants. The majority of plants were rated in normal condition, only 2 waypoints documented stressed plants. In addition, 104 dead plants were found.

There is a great degree of uncertainty about the boundaries and extent of the original 13 populations documented in the recovery plan, including the Slickrock Flats and North Long Point populations. For historical reference we used Element Occurrence Records No 2, 9, and 12 of the New Mexico Natural Heritage Program (Table 1) and Element Occurrence Records No 6 and 11 for the Sleeping Rocks population (Table 2).

Table 1. Number of Plants at the Slickrock Flats and North Long Point sites through time

NHNM	1986 - 1988	2020	Site Name
NHNM EO # 2	500	26	North Long Point
NHNM EO # 9	500	167	S of Slickrock Flats A
NHNM EO # 12	7699	15	Slickrock Flats A

118 live individuals were found at 27 waypoints at the Sleeping Rocks population, 94 plants were located on State Trust lands (18 waypoints), and 24 on BLM lands (9 waypoints), in the immediate vicinity of a transmission tower and an associated accessed road. A total of 45 dead plants were documented at the Sleeping Rocks site, including 16 dead plants on BLM managed lands.

Table 2. Number of Plants at the Sleeping Rocks site through time

NHNM	1986	2020	Site Name
EOR # 11/BLM	70	24	Sleeping Rocks
EOR # 6/SLO	482	94	Sleeping Rocks

Observed disturbances included active oil & gas development and planning (survey stakes), wood cutting in the immediate vicinity of Mancos milkvetch occupied habitat, invasive species, OHV traffic, and traffic associated with the maintenance of a transmission tower and an associated accessed road (Figures 5, 6, & 7).

Several other potential habitat areas were surveyed within the boundaries of the ACEC in 2020, without success. These areas were likely also surveyed in the 1980s and no additional populations were documented. Therefore, it is safe to assume that all extant populations of Mancos milkvetch within the ACEC have been documented.



Figure 5. Illegal wood cutting in the habitat of Mancos milkvetch inside the ACEC.



Figure 6. Invasive Russian thistle at a plugged oil well within the ACEC in the immediate vicinity of occupied Mancos milkvetch habitat.



Figure 7. Oil & gas development in the immediate vicinity of Mancos milkvetch habitat, inside the ACEC.

DISCUSSION

The 1989 recovery plan lists 13 populations of Mancos milkvetch totaling over 29,000 individuals. Based on 30 years of monitoring data and several repeat status surveys on the Navajo Nation, the current population does not come even close to the original population estimate, despite documented population fluctuations. Although some populations were documented to be disturbed by oil & gas development and well plugging in the past, the observed range wide decline over the last 3 decades cannot easily be explained by the occasional disturbance to the habitat or plants. The majority of populations are now located in areas with plugged oil wells where traffic and other disturbances are rare (Talkington 2019). Although many of the plugged wells on the Navajo Nation and BLM lands are hotspots for the establishment of invasive species such as Russian thistle, these are rarely observed growing in the microhabitat of Mancos milkvetch (cracks and tinajas). Reasons for the rangewide slow decline are likely associated with climate change and prolonged drought, possible changes to soil chemistry caused by fallout from nearby coal fired power plants, pollinator limitation and inbreeding depression. This alarming population trend needs further evaluation through research and direct actions to prevent extinction and damage to the very restricted habitat.

ACEC Populations

Although all Mancos milkvetch populations outside tribal lands are located inside the BLM Hogback ACEC boundaries and therefore seemingly protected, multiple disturbances were observed with a potential to further add to the decline of the species and degradation to the habitat, including illegal wood cutting, active oil & gas development, activities associated with powerline and transmission tower maintenance, and invasive species. The recovery plan identified these disturbances as threats and proposed various agreements, management plans and a long-term mineral, oil, gas and energy development plan to address this issue. However, no development plans, management plans or agreements have been completed and management prescriptions for the ACEC provide only limited on-the-ground protection for the species.

Since we do not have a defined mapped area for the Slickrock Flats and North Long Point populations it's difficult to fully document a population trend. However, Slickrock Flats was once considered the largest population of Mancos milkvetch containing thousands of plants. Certainly, plants have declined significantly in the northern half of the BLM portion of this population. The 5 monitoring plots at Slickrock Flats only contained a total of 4 adult plants and 3 seedlings in 2020 (Roth 2020). Three of the 5 long-term monitoring plots had no plants whatsoever. Only 41 individuals were found throughout the entire area, including the North Long Point population.

The Sleeping Rocks population is easily defined by the limited available habitat in the area, the majority of which is located on State Trust lands. A decline is evident from population trend monitoring as well as a census of the number of plants present in 2020. A total of 118 plants were documented in 2020, down from 552 in 1989. This decline is also reflected in the population trend monitoring results over the past 30 years. The 5 monitoring sites at Sleeping Rocks only contained 14 adult plants and no seedlings in 2020. Ongoing documented threats at the Sleeping Rocks site include oil & gas development and transmission line maintenance. Although the recovery plan specifically calls for the development of an agreement with the New

Mexico State Lands Office to protect the Sleeping Rocks site by minimizing future mineral, oil, and gas development at this location, such an agreement has not been materialized as of 2020 and the Sleeping Rocks site was staked for oil & gas development in 2018.

Long term demographic studies have documented that historically a high percentage of the Mancos milkvetch populations is composed of juvenile plants. Although plant densities fluctuated greatly from year to year in response to precipitation, the species successfully reproduced and recruitment offset mortality. However, in the past 2 decades recruitment apparently no longer offsets mortalities and the species appears to be on a rangewide slow decline.

Pollinators

Little is known about the pollinators of Mancos milkvetch and historically there appeared to be no concern about sufficient pollination and the production of seeds (Tepedino 2000, USFWS 2011). However, in 2019 the Navajo Natural Heritage Program found that on average just 37% of 141 adult plants observed rangewide had seed pods and that this percentage varied significantly between monitoring sites, possibly related to the number of plants per site (ranging from 9.5% to 61.5%)(Talkington 2019). Although the species is selfcompatible, Mancos milkvetch does exhibit a high degree of outcrossing and therefore relies on insects to move pollen from one plant to another (Tepedino 2000). Allphin reported that only 30% of seeds are viable per ovule (Allphin 2005). Plants flower in early April when not many other plants are flowering. If flowering plants are far and few in between, pollination success may be limited. Low seed/ovule ratios due to embryo abortion may be the result of inbreeding depression and needs further study.

Climate Change

The Southwest is the hottest and driest region in the United States. Climate change poses significant challenges for an already dry area that is expected to get even hotter and drier which will increase stress on the region's rich diversity of plants. The decade of 2001-2010 was the warmest in the 110-year recorded history, with temperatures almost 2°F higher than historic averages and are expected to rise even more (NCA 2014). Although the Southwest has seen many droughts in the past, future droughts are projected to be substantially hotter and are projected to become more frequent, intense, and longer lasting than in the historical record. Observation data suggest that historically Mancos milkvetch can recover after periods of drought. However, it appears that extended periods of drought brought on by climate change may limit the ability of the species to recover. The average annual rainfall at the nearby Farmington AG Science Center was 8.978 inches between 1990 and 1999. The average annual rainfall for the 6 monitoring years between 2002 and 2018 was 6.612 inches. Spring rainfall is essential for the germination and establishment of seedlings. Average spring precipitation (March – May) was 2.189 inches over the initial 10-year monitoring period from 1990 to 1999. The average spring precipitation was only 0.878 since 2002 over 6 monitoring years. Climate change is likely the largest threat to Mancos milkvetch rangewide.

Soil Chemistry

Two coal-fired power plants are located within a few miles of all Mancos milkvetch populations. The San Juan Generating Station is located on the NE side of the Hogback ACEC and has been in operation since the 1970s. The Four Corners Generating Station is located just south of the San Juan River has been in operation since the early 1960s. They are the largest source of air pollution in the state of New Mexico and a source for acid rain. Although the potential for acid deposition caused by the fallout from the power plants was raised in the recovery plan, no data has been collected to address this potential threat.

Mancos milkvetch is restricted to small poorly defined units of Point Lookout Sandstone. This high degree of specificity suggests that the species may be highly susceptible to alterations in soil chemistry, possibly rendering the microhabitat unsuitable for sufficient recruitment to offset mortality over time. Long term emissions from coal fired power plants may alter the physical properties of the soil and concentrations of available nutrients and trace elements. Soil samples were analyzed from the immediate vicinity of Mancos milkvetch populations in 1987, including pH (Knight 1987). Changes in available nutrients, soil chemistry and soil pH could be contributing to low recruitment levels.

MANAGEMENT RECOMMENDATIONS

Based on observed and potential threats to the species and its habitat within the ACEC the following management actions are recommended:

- Sign ACEC boundaries to make wood cutters aware of this prohibition
- Actively control or prohibit OHV traffic
- Retire existing oil & gas leases
- Consider fencing the remaining populations of ASHU in the vicinity of the transmission lines and tower, or otherwise block vehicle access to habitat
- Exchange State Trust lands or develop a management agreement
- Sample soils to determine current soil chemistry and pH
- Maintain fences and lock access gates
- Determine pollination success and study the potential of inbreeding depression
- Develop a propagation protocol from seed collections for potential population augmentation in the future
- Expand monitoring sites by increasing the number of monitoring plots at each site
- Monitor and control invasive species
- Increase monitoring frequency and document reproductive effort in the data gathering

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