U.S. FISH AND WILDLIFE SERVICE
5-YEAR STATUS REVIEW FOR THE
OSTERHOUT MILKVETCH
(*Astragalus osterhoutii*)

GENERAL INFORMATION:

Species: Osterhout milkvetch (*Astragalus osterhoutii*)

Federal Register Notice of Listing Determination: July 13, 1989. Endangered and Threatened Wildlife and Plants; Final Rule to Determine *Astragalus osterhoutii* and *Penstemon penlandii* to be Endangered Species (54 FR 29658).

Classification: Endangered species

Most recent status review: July 2, 2019. Osterhout milkvetch (*Astragalus osterhoutii*) 5-year review.

Federal Register notice announcing initiation of this 5-year status review: March 13, 2023. Endangered and Threatened Wildlife and Plants, Initiation of 5-Year Status Reviews of 27 Listed Species in the Mountain-Prairie Region (88 FR 15448).

Lead Region: Region 6 Mountain-Prairie Region, Colorado Ecological Services Field Office, Nathan Darnall, Western Colorado Supervisor, nathan_darnall@fws.gov, 970- 628-7180.

Current Recovery Priority Number (RPN): 5C, high degree of threats with a low recovery potential

Methodology used to complete this review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973 (16 U.S.C Section 1531 *et seq*.), as amended (Act), the purpose of a 5-year status review is to assess each threatened and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. Status reviews are to be completed in accordance with Sections 4(a) and 4(b) of the Act (16 U.S.C. Section 1533(c)). This 5-year status review was conducted by the U.S. Fish and Wildlife Service's (Service) Ecological Services Colorado Field Office. Data for this review were solicited from interested parties through a March 13, 2023, Federal Register notice announcing this review (88 FR 15448). We also contacted the Bureau of Land Management (BLM), Colorado Natural Heritage Program, and Denver Botanical Gardens to request any data or information we should consider in our review. Additionally, we conducted a literature search and a review of information in our files.

ASSESSMENT

Information acquired since the last status review:
We received additional and updated survey and monitoring reports from both the BLM and Colorado Natural Heritage Program in response to our Federal Notice initiating this 5-year status review. The results indicate that the species is still present at all previously known populations, and the species distribution remains the same as described in the previous 5-year status review for the Osterhout milkvetch (Service 2019a).

Review Summary:
The Osterhout milkvetch was listed as endangered on July 13, 1989 (54 FR 29658), along with the Penland beardtongue (*Penstemon penlandii*), primarily due to activities related to the development of the Wolford Mountain Reservoir and Dam, recreation, mining, and geographically isolated populations. The Service completed a recovery plan for both species (Service 1992) and a subsequent clarification of recovery criteria (Service 2019b).

Status of the Species
The Osterhout milkvetch is native to only a 15-mile (24-kilometer) radius near the town of Kremmling, Colorado and is restricted to moderate slopes with highly seleniferous, grayish-brown clay soils derived from shales of the Niobrara, Pierre, and Troublesome formations. The best available data for population trends come from the BLM Osterhout milkvetch (*Astragalus osterhoutii*) Demographic Trend Monitoring Summary and Status Report, summarized in **Figure 1** (Krening 2023a). Although these data come from discrete study sites within each population, we can extrapolate these trends to approximate the status of the species as a whole.

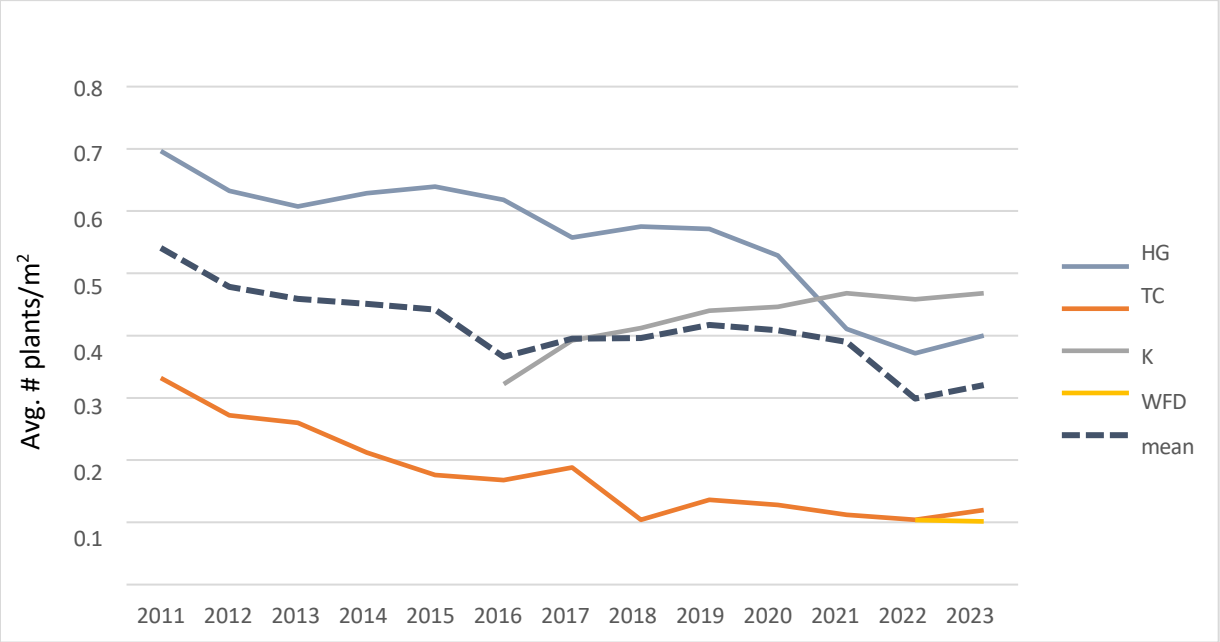

Figure 1: Individual Osterhout milkvetch population trends and mean. Only the four *Astragalus osterhoutii* monitoring sites for which trend data exist are shown: Horse Gulch (HG), Troublesome Creek (TC), Kremmling ACEC (K), Wolford Dam (WFD). The y-axis represents mean plant density (average number of plants/meter $(m)^2$). The mean trend (represented by the dashed line) was determined using a ratio estimator by dividing the average total number of plants among all sites in a given year by the

average area of all the study sites. In other words, the mean trend is the average density of all the plots measured over time.

In 2023, slight increases in mean plant density were observed at Horse Gulch, Troublesome Creek, and the Kremmling Area of Critical Environmental Concern (ACEC) sites relative to 2022 data, while a slight decline occurred at the Wolford Dam site relative to 2022 levels. Despite the increases in 2023, meaningful declines have occurred over the past decade at two of the three study sites for which long-term data exist. Since 2011, the Horse Gulch study site has decreased by 36 percent and Troublesome Creek has decreased by 64 percent. However, the Kremmling ACEC site has demonstrated an increase in mean plant density since its establishment in 2016, growing by nearly 50 percent over that duration. The average change of these 3 monitoring sites since 2011 represents a decline of approximately 14 percent (Krening 2023a). The disparity in trends between the 3 sites suggests that more sites are required to accurately detect range-wide trends. The addition of the Wolford Dam study site in 2022 and the Sunset study site in 2023 should provide us with greater ability to assess range-wide trends moving forward.

The most recent data from the BLM monitoring sites show that current trends are beginning to uncouple from previous trends. The Troublesome Creek site was once thought to be the population site with a higher potential for Osterhout milkvetch because of the higher soil clay percentage compared to soils at the Muddy Creek or Wolford Dam sites. This higher soil clay percentage theoretically helps with soil water retention, increasing species' resiliency to drought. However, the plants in the Troublesome Creek population have been experiencing a larger decline compared to other sites, possibly because Osterhout milkvetch individuals at Troublesome Creek are staying dormant underground for longer and recruitment rates are not high enough to compensate for the eventual mortality of long-lived individuals (Krening 2023a).

Threats, Conservation Measures, and Existing Regulatory Mechanisms

The following discussion provides a summary of the primary threats affecting the current condition for Osterhout milkvetch and the species' potential response to these threats. Current and potential future threats to Osterhout milkvetch analyzed in the listing decision (54 FR 29658) include reservoir construction and associated disturbances, including potential increases in recreational use (Factor A); vulnerability to collection and vandalism (Factor B); inadequacy of regulatory mechanisms (Factor D); impacts to pollinators and plants due to surface disturbance, and low genetic diversity (Factor E). Other current and future threats to Osterhout milkvetch include habitat disturbance and subsequent loss due to off highway vehicles (OHVs) traveling off designated routes, mineral exploration, road maintenance, energy corridor maintenance and potential expansion, competition from invasive plant species, and soil compaction due to cattle and wildlife trampling (Factor A); herbivory by black blister beetle (*Epicauta pennsylvanica*) (Factor C); and the potential effects of climate change on the frequency and intensity of drought (Factor E). See **Table 1** below for a summary of the threats facing Osterhout milkvetch.

Table 1: Summary of threats affecting Osterhout milkvetch and the associated listing factors.

Listing Factor	Threat Description
Factor A: The present or threatened destruction, modification, or curtailment of its habitat or range	Off highway vehicles (OHVs) traveling off designated routes, road maintenance (including snow plowing and weed control), energy corridor maintenance, competition with invasive plant species, and soil compaction due to cattle and wildlife trampling may result in habitat disturbance and subsequent habitat loss. The Troublesome Creek population is bisected by an energy corridor and may be vulnerable to conflict with powerline maintenance and potential expansion of the corridor. Additionally, the presence of crested wheatgrass (*Agropyron cristatum*) has been recently shown to reduce the recruitment rate of Osterhout milkvetch by inhibiting establishment of new seedlings (Krening 2023b). Finally, the construction of Wolford Mountain Reservoir and Dam flooded much of the Muddy Creek population. Increasing interest in recreational opportunities, especially around the reservoir, could increase impacts from OHV use and the spread of invasive plants.
Factor B: Overutilization for commercial, recreational, scientific, or educational purposes	Osterhout milkvetch has showy flowers and grows in accessible areas, and thus it may be vulnerable to collecting and vandalism. We have no evidence to indicate that this factor poses a population-level stressor.
Factor C: Disease or predation	Blister beetles (*Epicauta pennsylvanica*) have been observed feeding *en masse* on the flowers of Osterhout milkvetch, particularly at the Muddy Creek population (Taliga 2011, Krening 2023a). Because of the impact of beetle damage on the plant's reproductive structures, this stressor could become a population-level threat (Krening 2023a). More research is needed to determine the demographic impacts of the blister beetles on Osterhout milkvetch.
Factor D: Inadequacy of existing regulatory mechanisms	Since the listing of the plant, some of the threats due to development have been curtailed; however, disturbances to Osterhout milkvetch are still present. The BLM's Kremmling Field Office Resource Management Plan provides conservation for Osterhout milkvetch through the designation of ACECs, and stipulation NSO-7 prohibits surface occupancy or use within 656-ft (200 m) of the edge of occupied habitat for federally listed, proposed, and candidate species (BLM 2015 FEIS).
Factor E: Other natural or manmade factors affecting its survival	Osterhout milkvetch is an obligate outcrossing species, meaning it cannot self-pollinate, and thus requires primarily ground-nesting bumble bees for pollination (Johnson 1990). This reliance on pollinators could pose a limitation to recovery as the abundance and diversity of pollinators continues to decrease (Armstead et al. 2024). The species' narrow geographic range and habitat specificity exacerbate its vulnerability to many of the threats evaluated in this review. In a recent

Listing Factor	Threat Description
	genetic analysis, all sampled populations of Osterhout milkvetch exhibited relatively low levels of genetic diversity (Mowad 2022), which is consistent with rare, endemic species that are composed of small, fragmented populations. This lack of genetic diversity has the potential to reduce species' resiliency. The effects of climate change on the frequency and intensity of drought have been identified as a contributing factor in recent population declines (Krening 2022). Despite the species' ability to mitigate the effects of drought by remaining dormant under unfavorable conditions, the arid nature of the species' range emphasizes that moisture availability is the primary limiting factor influencing plant growth and reproduction (Krening 2022).

Conclusion:
After a review of the best available scientific information, we conclude that Osterhout milkvetch meets the definition of an endangered species due to ongoing threats related to climate change, narrow geographic range, energy corridor maintenance, disease, and other threats described above. Therefore, with this 5-year status review, we recommend that the species retains its status as an endangered species under the Act.

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OSTERHOUT MILKVETCH
(*Astragalus osterhoutii*)

CURRENT CLASSIFICATION: Endangered

RECOMMENDATION RESULTING FROM THE 5-YEAR STATUS REVIEW:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (Indicate reasons for delisting per 50 CFR 424.11):
    ____ Extinction
    ____ Recovery
    ____ Original data for classification in error
_X__ No change is needed

Lead Field Office Approval:

Signature: NATHAN DARNALL Digitally signed by NATHAN DARNALL Date: 2024.07.23 12:56:26 -06'00' _____ Date: _____

Literature Cited:

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