

Astragalus magdalenae var. *peirsonii*
(Peirson's milk-vetch)

**5-Year Review:
Summary and Evaluation**



Photo courtesy of the U.S. Fish and Wildlife Service 2024

**U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
Carlsbad, California**

August 2024

5-YEAR REVIEW

***Astragalus magdalenae* var. *Peirsonii* (Peirson's milk-vetch)**

GENERAL INFORMATION

Species: Peirson's milk-vetch (*Astragalus magdalenae* var. *peirsonii*), a plant species
Date listed under the Endangered Species Act: October 6, 1998, listed as threatened (Service 1998)
Recovery Plan: Recovery Plan for *Astragalus magdalenae* var. *peirsonii* (Service 2019a)
Recovery Priority Number: 15
Critical Habitat Designation: (Service 2008) (73 FR 8748)
State of California classification: Endangered

BACKGROUND

Under the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*), the U.S. Fish and Wildlife Service (Service), referred to as “we” in this document, maintain lists of endangered and threatened wildlife and plant species (referred to as the List) in the Code of Federal Regulations (CFR) at 50 CFR 17.11 (for wildlife) and 17.12 (for plants). Section 4(c)(2)(A) of the Act requires us to review each listed species' status at least once every 5 years.

Most Recent Status Review: Service 2019b. *Astragalus magdalenae* var. *peirsonii* (Peirson's milk-vetch) 5-year Review: Summary and Evaluation. Carlsbad Fish and Wildlife Office, Carlsbad, California. 62 pp.

Federal Register Notice Announcing this Status Review: On August 17, 2023, we published a Federal Register notice announcing initiation of the 5-year review of this species, and the opening of a 60-day comment period to receive information (Service 2023, pp. 56042–56044). We did not receive any comments about Peirson's milk-vetch.

REVIEW ANALYSIS

Species Overview and Habitat: Peirson's milk-vetch is a perennial plant in the legume family (Fabaceae). This taxon grows in sand dune habitat on the Algodones Dunes (Imperial Sand Dunes) in eastern Imperial County, California (Figure 1). Its range continues south to dunes in the Gran Desierto in Sonora, Mexico (Barneby 1959, pp. 855–857; Felger 2000, pp. 300–301; Estrada Castellón *et al.* 2023, p. 95).

2024 5-year review for *Astragalus magdalenae* var. *peirsonii* (Peirson's milk-vetch)



U.S. Fish & Wildlife Service
Peirson's milk-vetch 2024 5-year review

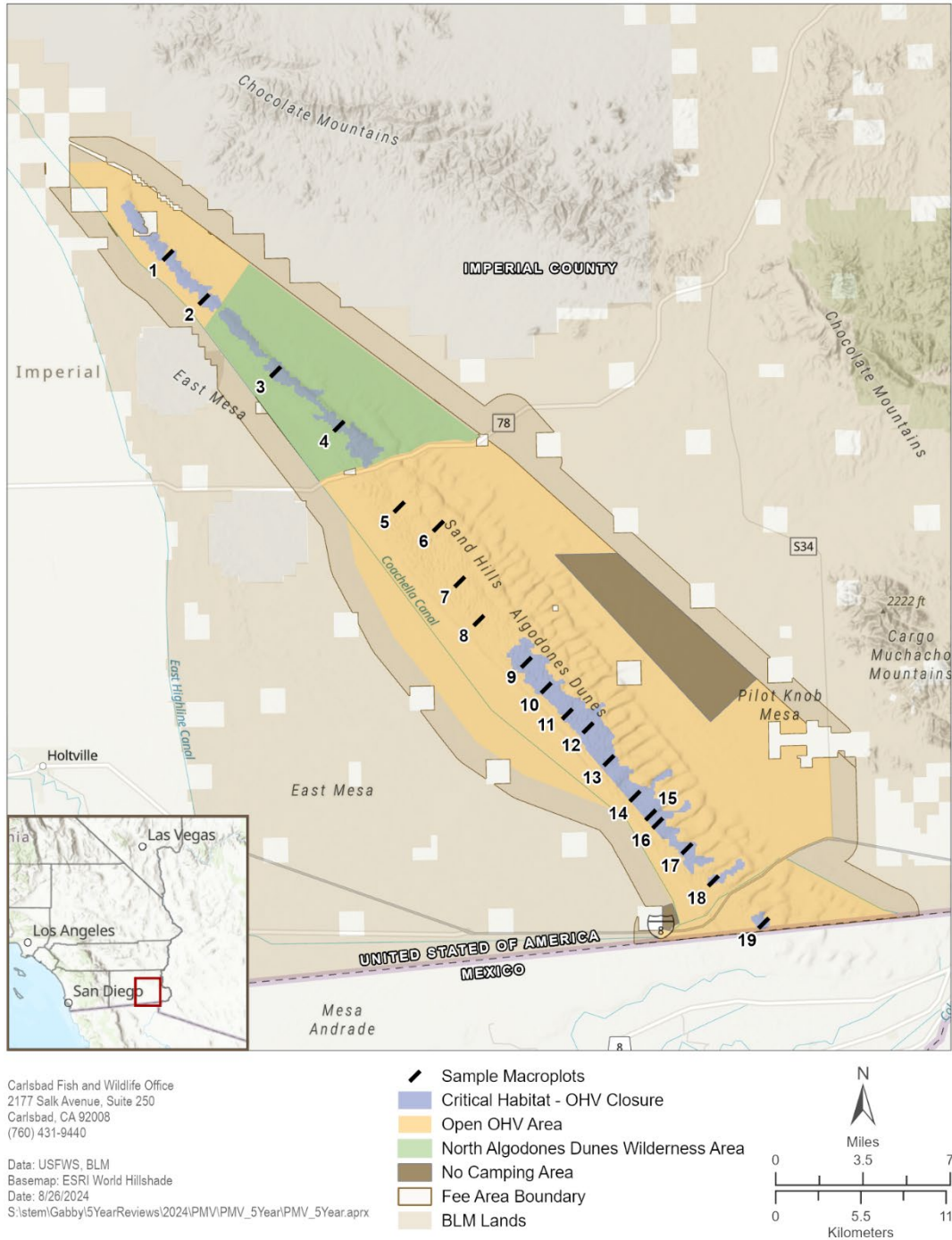


Figure 1. Management areas and Peirson's milk-vetch sampling macroplots on the Algodones Dunes in California.

ASSESSMENT

Information Acquired Since the Last Status Review

This 5-year review was conducted by the Service's Carlsbad Fish and Wildlife Office. We solicited information for this review from the public and interested parties through a Federal Register notice announcing this review on August 23, 2023. We also contacted staff from the Bureau of Land Management (BLM) El Centro Field Office to request any data or information we should consider in our review. Additionally, we conducted a literature search and reviewed information in our files.

SUMMARY OF NEW INFORMATION SINCE 2019

Abundance

The BLM continues to monitor Peirson's milk-vetch annually (BLM 2023b, p. 1). The number of macroplots (Figure 1) monitored each year is based on prior-year (October through December) rainfall amount (BLM and Service 2014, p. 1). In 2020, when average prior-year rainfall was 1.87 inches (4.75 centimeters), BLM monitored all 19 macroplots (BLM 2020, pp. 9, 13). In all other years, when rainfall was below that threshold, BLM monitored 7 macroplots. Abundance within the 7 monitored macroplots has fluctuated from year-to-year; since 2019, total plant count has ranged from 57 (in 2023) to 13,463 (in 2019) (BLM 2019b, p. 12; 2023b, pp. 14–15). The number of plants greater than 1-year old was highest in 2021 (175 plants), the year after above-average precipitation in 2020 (BLM 2021b, pp. 13, 16). A study using drone surveys of the macroplots found that larger Peirson's milk-vetch could be distinguished from other dune species, which could assist monitoring in the future (Basset *et al.* 2023, pp. 8, 11, 15–16).

Environmental variables besides precipitation amount and timing may drive Peirson's milk-vetch abundance. For another dune-endemic milk-vetch in southern California¹, precipitation was not positively correlated with abundance (Sweet *et al.* 2022, pp. 34–35). The authors suggested that higher precipitation may stabilize dunes and reduce seed scarification, which is needed for germination (Sweet *et al.* 2022, pp. 34–35).

CONSERVATION AND MANAGEMENT

The BLM manages the Algodones Dunes under the 2013 Imperial Sand Dunes Recreation Area Management Plan (ISD RAMP; BLM 2013, entire). The ISD RAMP designates areas as open, closed, or limited to off-highway vehicle (OHV) use (BLM 2013, p. 2.88, 2.95) (Figure 1). Closed areas include Peirson's milk-vetch critical habitat—which we designated in 2008 (Service 2008, entire)—and the North Algodones Dunes Wilderness (Figure 1). The RAMP has five goals and objectives for Peirson's milk-vetch, including to “[p]romote population increase and protect habitat necessary to promote recovery” (PMV-01) and “[p]rovide for habitat

¹ Coachella Valley milk-vetch (*Astragalus lentiginosus* var. *coachellae*).

connectivity between Peirson's milk-vetch populations throughout the dunes" (PMV-02) (BLM 2013, p. 2.46–2.47; Service 2019b, pp. 36–39).

Threats

Our 2019 5-year review discussed four threats or stressors to Peirson's milk-vetch: (1) OHV recreation, (2) herbivory and seed predation, (3) low reproduction and loss of genetic diversity, and (4) climate change (Service 2019b, pp. 26–47). Our 2019 5-factor analysis remains a current assessment of threat presence, scope and magnitude. For this review we updated information about two threats (OHV recreation and climate change) and discuss nonnative plants as a potential stressor.

Off-Highway Vehicle Recreation

In our 2019 5-year review, we discussed OHV impacts to Peirson's milk-vetch habitat (Factor A) and plants (Factor E) (Service 2019b, pp. 28–30, 39–44). At the time, BLM monitoring data and law enforcement records reported OHV trespass into closed areas of Peirson's milk-vetch habitat (Service 2019b, p. 40).

The BLM continues to implement the ISD RAMP and to (1) monitor, repair, and install signage to indicate closed areas of the dunes, (2) conduct outreach to visitors about dune resources, and (3) enforce closures (BLM 2019b, pp. 2–4; 2021a, pp. 2–4; 2022a, pp. 2–4; 2023a, pp. 2–4). Of 6,207 formal warnings in 2022, BLM law enforcement estimated that at least 400 warnings were due to violation of the Peirson's milk-vetch closures (BLM 2022a, p. 4). Annual Peirson's milk-vetch monitoring also continues to record OHV tracks into closed areas (BLM 2022b, p. 21; 2023b, pp. 25–26).

Since 2019, one study has examined vegetation differences across the dunes. Cheung *et al.* (2021, p. 4) compared vegetation between OHV-open and closed areas² using imagery between 2001 and 2016. Within both open and closed areas, mean daytime and nighttime land surface temperature increased, and vegetation cover decreased (Cheung *et al.* 2021, pp. 4–5). Open OHV areas south of Highway 78 had significantly lower vegetation cover compared to closed areas of the North Algodones Dunes Wilderness (Cheung *et al.* 2021, pp. 6–7).

Climate Change

Daily maximum and minimum temperatures are expected to increase in Southern California deserts under future emissions scenarios (Hopkins *et al.* 2018, pp. 14, 15). Extremely hot days are projected to become more frequent and intense (Hopkins *et al.* 2018, p. 14). Precipitation in California's deserts is highly variable from year to year (Hopkins *et al.* 2018, pp. 12, 16), and in the future, wet and dry extremes are projected to become more frequent (Swain *et al.* 2018, p. 430).

² This study examined imagery in four 2-kilometer transects spanning the North Algodones Dunes Wilderness and the open OHV area south of Highway 78 (Cheung *et al.* 2021, p. 4).

Climate change can affect plant physiology, distribution, and phenology (Hughes 2000, p. 59). Winter rains in the Sonoran Desert have been arriving later: in the 1980s, germination-triggering rain events often began in October, but by the 2010s, those events began in December (Kimball *et al.* 2010, p. 1559). Additionally, phenological timing is advancing for some Sonoran Desert shrubs in response to warmer spring temperatures (Zachmann *et al.* 2021, pp. 473, 481).

On larger scales, climate change can also affect vegetation cover and ecological processes. For example, in some areas of the lowland California desert,³ perennial vegetation cover declined between 1984 and 2017, driven by higher temperatures and drought conditions (Hantson *et al.* 2021, pp. 9–11). For the North Algodones Dunes Wilderness, Cheung *et al.* (2021, pp. 4–6) reported declining vegetation cover⁴ between 2001 and 2016, which may be driven by increasing summer land surface temperatures. Dune mobility could increase if soil moisture decreases or if extreme precipitation events increase sediment availability to the dunes (East and Sankey 2020, pp. 11, 24–29), although those interactions have not been studied for the Algodones Dunes.

Climate change could affect Peirson's milk-vetch individuals, the population, and dune ecology. While climate models project increasing temperature and precipitation extremes, the taxon's ability to adapt to projected changes is unclear.

Nonnative Invasive Plants

Sahara mustard (*Brassica tournefortii*) is an annual plant native to Eurasia (Winkler *et al.* 2019, pp. 7928–7929). This species is invasive throughout western North America (Winkler *et al.* 2019, pp. 7928–7929). Sahara mustard has affected other dune communities in Southern California by stabilizing sand, outcompeting native plants, and reducing insect abundance and diversity (Barrows and Heacox 2021, p. 249).

There are few Sahara mustard observations in the active dune areas of the Algodones Dunes (iNaturalist 2024). Currently, this nonnative plant likely does not threaten Peirson's milk-vetch individuals or populations. If Sahara mustard spread into the more active dunes, it could affect Peirson's milk-vetch or pollinators (or both) in the future.

RECOVERY CRITERIA

We completed a recovery plan for Peirson's milk-vetch in 2019. Though recovery criteria have not been met, two ongoing efforts will allow us to assess progress towards recovery. Ongoing monitoring will allow us to assess whether populations are stable or increasing over time (contributing to recovery criteria A.1, A.2, and E.2). Ongoing genetic studies by the California Botanic Garden will also allow us to assess whether the Algodones Dunes population has enough genetic diversity to maintain viability into the future (contributing to recovery criteria E.1 and E.2).

³ This study examined desert areas of Anza Borrego Desert State Park to the U.S.-Mexico border but did not include the Algodones Dunes.

⁴ A Normalized Difference Vegetation Index (NDVI) quantifies vegetation greenness and can be used to assess vegetation density and plant health.

CONCLUSION

We summarized new information about recreational OHV use, climate change, and nonnative plants. Our 2019 5-year review remains a current assessment of the taxon's status. We conclude that Peirson's milk-vetch remains a federally threatened taxon and recommend no status change.

RECOMMENDATIONS FOR FUTURE ACTIONS

We recommend that the following actions be completed over the next 5 years to enhance habitat and manage threats, in cooperation with partners.

1. Continue to implement the ISD RAMP goals, objectives, and management actions for Peirson's milk-vetch (BLM 2013, p. 2.46–2.47; Service 2019b, p. 4).
2. Continue to monitor the species to detect population changes over time (BLM 2013, pp. 2–47; Service 2019b, p. 2).
 - a. Analyze Peirson's milk-vetch monitoring data in relation to climate variables to determine what conditions explain plant abundance.
 - b. Model Peirson's milk-vetch abundance under projected future climate scenarios to assess species' viability in the future.
3. Evaluate climate change adaptation frameworks (e.g., Resist-Accept-Direct and others) to develop and implement management strategies for Peirson's milk-vetch in response to climate change (BLM 2013, p. 2.47; Service 2019b, pp. 3, 5).
4. Conserve, enhance, or restore genetic diversity in Peirson's milk-vetch (BLM 2013, pp. 2.46–2.47; Service 2019b, pp. 3–4).
 - a. Continue to assess genetic diversity and population genetic structure in Peirson's milk-vetch, including plants of different size classes.
 - b. Recommend genetic management strategies using existing frameworks (e.g., Ottewell *et al.* 2016).
 - c. Implement genetic management strategies if needed.
5. Evaluate conservation translocation or reintroduction as tools to maintain or enhance population size and genetic diversity, following best management practices (e.g., Center for Plant Conservation 2019). Plan and implement conservation translocations if needed.

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