Astragalus Jaegerianus
(Lane Mountain milk-vetch)

5-Year Review:
Summary and Evaluation

Photo by Naomi Fraga, California Botanic Garden

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

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5-YEAR REVIEW

Astragalus jaegerianus
(Lane Mountain milk-vetch)

GENERAL INFORMATION

Species: *Astragalus jaegerianus* (Lane Mountain milk-vetch), a plant species.
Date listed under the Endangered Species Act: October 6, 1998
Federal Register citation: Service 1998 (63 FR 53596–53615)
Classification: Endangered
Recovery Plan: There is no recovery plan for this species.
Recovery Priority Number: 5
Critical Habitat Designation: Service 2011 (76 FR 29108–29129)

BACKGROUND

Under the Endangered Species Act of 1973 (Act), 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 2014. Endangered and threatened wildlife and plants; 12-month finding on a petition to reclassify *Astragalus jaegerianus* as a threatened species.

In 2011, we were petitioned to reclassify *Astragalus jaegerianus* (Lane Mountain milk-vetch) based on our 2008 5-year review analysis and recommendation. We prepared a Species Report to assess the status of Lane Mountain milk-vetch (Service 2014a, entire). In 2014, we published a 12-month finding and found that the petitioned action was not warranted (Service 2014b, p. 25091). This current review is based on changes since the 2014 Species Report and 12-month finding.

Federal Register notice announcing this status review: On May 20, 2021, we published a *Federal Register* notice announcing initiation of the 5-year review of this species, and the opening of a 60-day period to receive information from the public (Service 2021a, entire). We did not receive any comments about Lane Mountain milk-vetch.

Species overview and habitat: Lane Mountain milk-vetch is a cryptic perennial species that typically twines up through a host shrub, which it uses for structural support and protection from herbivory. Although the taproot is perennial, the aboveground portion of the plant is herbaceous, resprouting from the taproot or old stems with the first winter rains, and then dying back during the drier summer months. In dry years with little rainfall, taproots may remain dormant, and few plants will be visible. In wet years with more rainfall, individuals may grow vegetatively and produce seed to varying degrees depending on other factors (Rundel *et al*. 2006, pp. 16–30).

ASSESSMENT

Information Acquired Since the Last Status Review

This 5-year review was conducted by the Service's Carlsbad Fish and Wildlife Office. Data for this review were solicited from the public and interested parties through a *Federal Register* notice announcing this review on May 20, 2021 (Service 2021a, entire). We also contacted staff from the U.S. Army's Fort Irwin and the Bureau of Land Management (BLM) Barstow 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 2014

Occurrence Status

We reviewed the California Natural Diversity Database (CNDDB) for changes in Lane Mountain milk-vetch distribution since the last review. All four populations areas (Brinkman Wash-Montana Mine, Goldstone, Paradise Valley, and Coolgardie Mesa) are considered extant and encompass 21 CNDDB[1] occurrences (Table 1).

Abundance

Fort Irwin provides annual monitoring of all Lane Mountain milk-vetch populations (Figure 1). We reviewed Fort Irwin's Annual Monitoring Report (Skandalis 2021, entire) for changes in Lane Mountain milk-vetch abundance. Information on abundance, survivorship, reproduction, and habitat (host plant condition) is available from 2005 through 2021 (Skandalis 2021, pp. 12–33). In 2013, Lane Mountain milk-vetch relative abundance in monitoring plots was stable, but low (114 plants) (Service 2014a, pp. 31, 37).

Lane Mountain milk-vetch emergence is highly dependent on water availability (Rundel *et al*. 2006, pp. 29–30) and 2021 conditions were extremely dry. Counts during 2021 found 13 plants, which was one of the lowest years in terms of abundance and reproduction (Skandalis 2021, p. 31). Similarly, live host plant cover was lower compared to the previous year (Skandalis 2021, p. 31). This is significant because host plants are required for Lane Mountain milk-vetch survival. Although Lane Mountain milk-vetch can stay dormant during drought years (in some cases 5 or more years), prolonged drought conditions could cause increased levels of adult mortality.

[1] The California Natural Diversity Database (CNDDB) is an inventory of the status and locations of rare plants and animals in California. The CNDDB assigns "Element Occurrence" (EO) numbers to unique locations of rare taxa. In this document, we use the term "occurrence" to refer to EOs delineated by the CNDDB, or locations not in the CNDDB that are greater than 0.25 miles (0.40 kilometers) apart.

Table 1. Occurrence Table for Lane Mountain Milk-vetch.

Population name	EOs	Acres	Land status	Conservation status	2014 status	2023 status	Threats	Number of plants in monitoring plots in 2021[1]	Highest count in monitoring plots since 2013[2]
Coolgardie Mesa	1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18	2,765	BLM, Private, Military	BLM ACEC[3] (12,706 acres)	Extant	Extant	Drought, climate change, mining, OHV,[4] invasive plants	4	2017 (77 plants)
Brinkman Wash- Montana Wine	4, 6, 20, 21, 22, 23	1,832	Military	Brinkman Wash Restricted Access Area (3,700 acres)	Extant	Extant	Drought, climate change, development, mining, OHV,[4] military activities	2	2019 (36 plants)
Paradise Valley	7, 24	1,656	BLM, Military	BLM ACEC (833 acres), East Paradise Conservation Area (4,300 acres)	Extant	Extant	Drought, climate change, development, mining, OHV,[4] military activities	1	2019 (50 plants)
Goldstone	19	647	Military	National Training Area –Gemini Conservation Area (2,471 acres)	Extant	Extant	Drought, climate change	5	2020 (23 plants)

[1] Skandalis 2021, p 15.
[2] Bedford 2017, p. 15; Goodman 2019, p. 16; Backus and Floyd 2020, p. 14.
[3] Area of Critical Environmental Concern.
[4] Off-highway Vehicle.

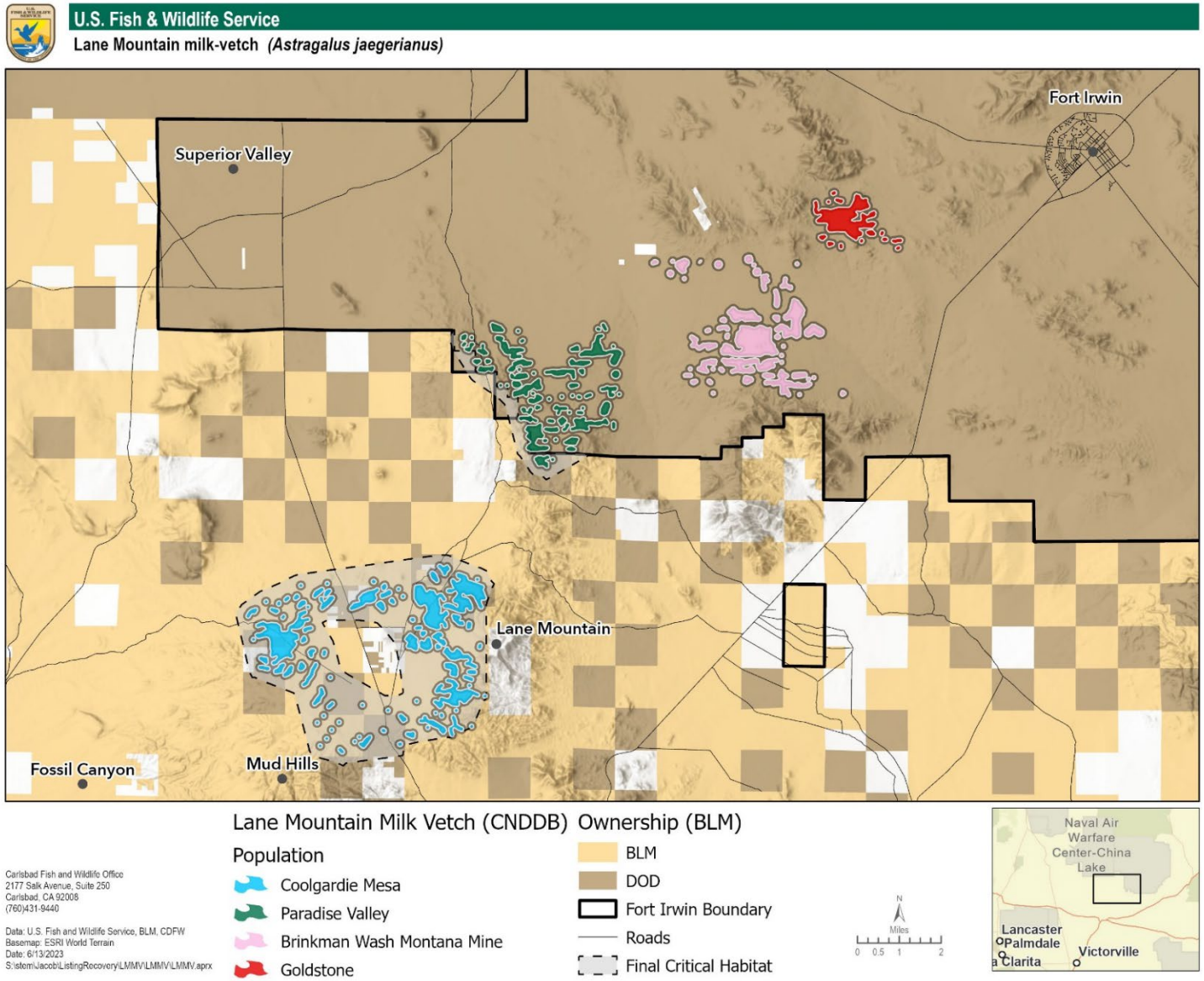

Figure 1. Lane Mountain milk-vetch populations and land ownership, showing Department of Defense (DoD) and BLM lands.

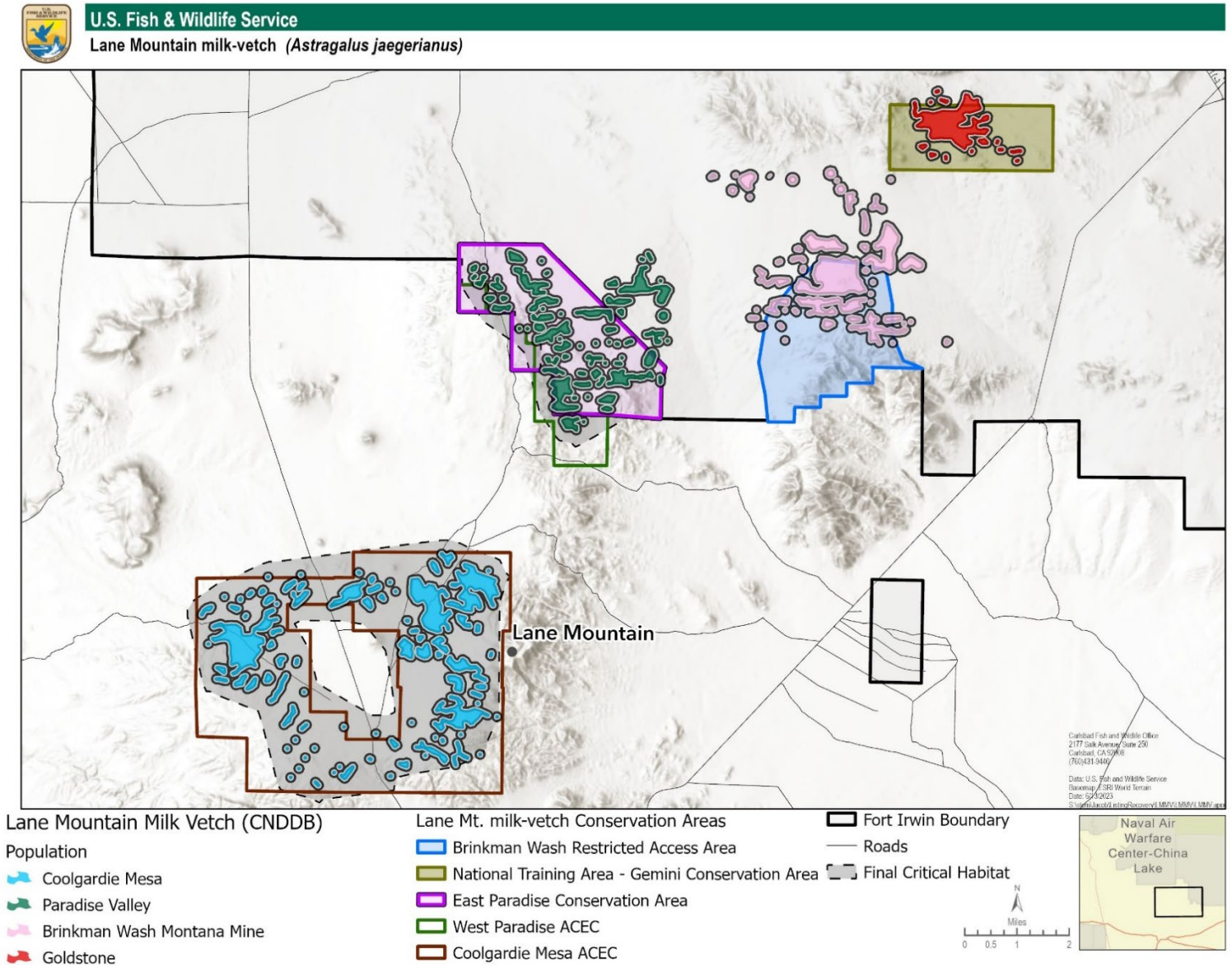

Figure 2. Lane Mountain milk-vetch conservation areas.

Fruit and Seed Predation

In our 2014 Species Report and last 12-month finding, we included information on predation, but there was very little information on fruit and seed predation. Between 2014 and 2016, Klinger *et al*. (2017, entire) conducted a study at Fort Irwin on the effects of Lane Mountain milk-vetch fruit and seed predation by small mammals. They found that Merriam's kangaroo rat and little pocket mouse are the most abundant species with the greatest potential impact on Lane Mountain milk-vetch (Klinger *et al*. 2017, p. 14). Peak fruit production coincided with rapid increases in seed predators. Klinger *et al*. (2017, entire) also examined removal rates, functional response to varying fruit density and removal distance form parent plants. Predation was very high, with virtually all fruits removed within one to four nights (Klinger *et al*. 2017, p. 1). The potential for beneficial dispersal by predators was low because most fruits were eaten when cached under shrubs, and uneaten fruits were often left in unfavorable interspaces (Klinger *et al*. 2017, p. 1). However, direct predation on seeds alone was considerably lower (Klinger *et al*. 2017, p. 42). Compared with fruits, seeds are less likely to move by natural processes such as wind or water, so fruit predation limits both seed available for recruitment, as well as dispersal into new habitats.

THREATS

In the 2014 12-month finding, we discussed elevated threats to Lane Mountain milk-vetch from increased off-highway vehicle (OHV) activities, climate change and drought (Service 2014a, p. 25086). For this review, we have new information about these threats as well as military training, mining, invasive plants, and fire. Refer to the 2014 Species Report for detailed discussion of other threats to Lane Mountain milk-vetch (Service 2014a, pp. 40–100).

Military Training

In 2021, we issued a biological opinion to Fort Irwin for the use of additional training lands which also included the implementation of the Recovery and Sustainment Partnership (RASP) Initiative (Service 2021b, entire). While the Biological Opinion for this action stated that there would be no change in effects to Lane Mountain milk-vetch from increased training flexibility and the intention of the RASP agreement was for desert tortoise conservation, the Army provided funding for conservation actions off-installation that included the Coolgardie Mesa Lane Mountain milk-vetch population area; therefore these actions are expected to benefit both the Lane Mountain milk-vetch population as well as desert tortoise (Service 2021b, pp. 2, 75).

Fort Irwin's plan to expand training could disturb Lane Mountain milk-vetch on 4,598 of the 21,349 acres (ac) [1,861 of the 8,640 hectares (ha)] rangewide habitat (Service 2021b, p. 73); however, the previously approved expansion has not yet occurred. Areas proposed for future training will be used at varying intensities, and the levels of loss of individuals and habitat will differ accordingly (Service 2021b, pp. 69–70). The Army continues to maintain conservation areas for Lane Mountain milk-vetch, including the fenced 2,471 ac (1,000 ha) National Training Center-Gemini Conservation Area at Goldstone, the 4,300 ac (1,740 ha) East Paradise Conservation Area, and 1,872 ac (758 ha) of habitat in the Brinkman Wash Restricted area (Figure 2).

Through implementation of the Department of Defense's Readiness and Environmental Protection Integration program, the Army has voluntarily secured 3,476 ac (1,407 ha, calculated using overlap between Department of Defense lands and Lane Mountain milk-vetch Conservation Areas-West Mojave Plan GIS datasets). This habitat is permanently protected outside the base within the BLM Coolgardie Mesa ACEC boundary (Service 2021b, p. 74). These areas are primarily small parcels purchased adjacent to larger tracts of BLM land, which benefit Lane Mountain milk-vetch by precluding development on these lands and reducing the potential for increased fragmentation of Lane Mountain milk-vetch habitat.

Mining

The BLM Barstow Field Office manages mining activities that occur or may occur within Lane Mountain milk-vetch habitat. These activities primarily occur within the Coolgardie Mesa Population and have not changed since the last review (see Service 2014a, pp. 60–68). Most of these actions are small scale (5 ac or less) exploratory actions and do not require approval of a Plan of Operation. The BLM prepared a package for withdrawal of these lands from minerals entry in 2017, but the action was never completed and has since remained inactive (Otahal 2022, pers. comm.). New mining claims can be established and mining at levels greater than casual use can be approved through the approval of a Plan of Operation.

Off-highway Vehicles

The BLM Barstow Field Office manages OHV activities that occur within Lane Mountain milk-vetch habitat. These activities primarily occur within the Coolgardie Mesa population, where travel is restricted to existing routes. BLM actively works to ensure compliance through visitor education and contact, signage, barriers, and restoration of disturbed areas.

The BLM (2019, entire) revised their West Mojave Route Network Project, which changed how motorized vehicles may use portions of Lane Mountain milk-vetch habitat that occur on BLM-managed lands. This decision did not significantly change the total amount of Lane Mountain milk-vetch habitat affected (BLM 2019, pp. 360, 377). However, effects from parking, camping, or staging were reduced by 46.2 ac and would only occur in previously disturbed areas (BLM 2019, pp. 360, 377). In our Biological Opinion for the West Mojave Route Network Project, we concluded that the changes to OHV management by the BLM were not likely to jeopardize the continued existence of Lane Mountain milk-vetch (Service 2019, p. 95). We reached this conclusion because the BLM is not proposing to develop new routes through known occurrences of this species; and the BLM will allow stopping, parking, and camping only in previously disturbed areas, which are unlikely to support individuals of this species (Service 2019, p. 75).

Climate Change

Climate change refers to a shift in the mean or variability in measures of climate (e.g., precipitation or temperature) that persists for an extended period (typically a decade or more) due to natural variability, human activity, or both (IPCC 2013, p. 1450). In our 2014 12-month finding, we considered climate change and drought as threats to Lane Mountain milk-vetch. Temperature has increased throughout southern California over the past century, and warming is expected to continue (Hopkins *et al*. 2018, pp. 12, 14). While climate models predict little change in average

annual precipitation, the region is experiencing a 22-year drought, one of the most severe in over 1,200 years (Williams *et al*. 2022, p. 232).

We reviewed climate change projections from (CEC 2022, entire). These data project a continued increase in average annual minimum and maximum temperatures for the range of Lane Mountain milk-vetch (CEC 2022, entire) (Table 2). The effects of this combination of increasing temperature with typical low annual precipitation are similar to those described in the 2014 Species Report (Service 2014a, pp. 90–95). Seasonal minimum and maximum temperatures in all seasons will increase and there is projected to be longer and hotter summer heat waves, less frequent cold snaps, hotter and more frequent droughts, and decreased precipitation (Overpeck *et al*. 2013, in Service 2014a, p. 90). As a result of expected increased aridification, we expect effective precipitation will further reduce from increased evapotranspiration (Overpeck and Udall 2020, p. 11857).

Table 2. Projected Annual Average Minimum and Maximum Temperatures Across the Range of Lane Mountain Milk-vetch.[1]

Year Range	RCP 4.5 projected annual average minimum temperature (°F)	RCP 4.5 projected annual average maximum temperature (°F)	RCP 8.5 projected annual average minimum temperature (°F)	RCP 8.5 projected annual average maximum temperature (°F)
Historical (1961–1990)	47.6 (range 45.1–50.2)	77.5 (range 74.3–80.6)	Same as RCP 4.5	Same as RCP 4.5
Mid-century (2035–2064)	51.7 (range 49.4–55.0)	82.0 (range 79.1–85.0)	52.8 (range 49.7–56.8)	83.2 (range 79.6–87.9)
End of century (2070–2099)	53.1 (range 50.4–55.6)	83.4 (range 80.7–86.7)	56.9 (range 53.1–61.4)	86.5 (range 81.8–90.6)

[1] The values are the average of projections from four priority models (MIROC5, CanESM2, HadGEM2-ES, and ENRM-CM5) during the mid-century (2035–2064) and end-of-century period (2070–2099). Data from Cal-Adapt (CEC 2022, entire). All columns display the modeled 30-year annual average and range in degrees (°) Fahrenheit.

Nonnative Invasive Plants and Fire

During the last review, we identified nonnative invasive plants and fire as threats to individual Lane Mountain milk-vetch plants and habitat. Species such as red brome (*Bromus madritensis)*, cheatgrass (*Bromus tectorum*) and Mediterranean grasses (*Schismus arabicus* and *S. barbatus)* had expanded in distribution in the Mojave Desert, potentially increasing the chance of fire (Service 2014a, p. 95). Black mustard (*Brassica nigra*) is also expanding its distribution, primarily in disturbed areas within the range of Lane Mountain milk-vetch. As suggested in the last review, additional spread of nonnative invasive plants is likely, because they are expected to respond positively to climate change impacts, including disturbance from drought and other extreme weather events (Archer and Predick 2008, p. 26 in Service 2014a, p. 95). BLM efforts to reduce disturbance from OHV activities may limit the spread of black mustard. No new fires have occurred in Lane Mountain milk-vetch habitat since the last review (Otahal 2022, pers. comm.).

Summary of Threats

Since the 2014 12-month finding, we received new information about five threats to Lane Mountain milk-vetch: (1) military training, (2) mining, (3) OHV activities, (4) climate change, and (5) nonnative invasive plants.

In our consultations with Fort Irwin on Lane Mountain milk-vetch, we concluded that the expansion of training into new areas was not likely to jeopardize the continued existence of the species. The Army provided funding for off-base conservation actions for desert tortoise, which includes actions that also benefit the Coolgardie Mesa Lane Mountain milk-vetch population.

In our 2014 12-month finding, we discussed mining and the BLM's efforts to withdraw lands within the Coolgardie Mesa ACEC for the protection of Lane Mountain milk-vetch habitat. This withdrawal was not processed and is inactive. Currently, the area is open to new mining claims, and mining at scales greater than casual use could proceed with the approval of a Plan of Operations.

OHV use continues to be a threat to Lane Mountain milk-vetch at three of the four populations. Since the last review, the BLM revised their West Mojave Route Network Project, which guides travel management on BLM roads that intersect Lane Mountain milk-vetch habitat. Little change in total miles occurred, but the revision did include a reduction in motorized access along road edges for camping and staging. This decision would reduce the potential area of disturbance by motorized users and may divert users to other areas.

Climate modeling available since the last review continues to project increased temperatures and precipitation extremes, but we do not have new information or models about how these changes could affect Lane Mountain milk-vetch in the future.

Since the last review, the nonnative plant species black mustard has expanded its range into Lane Mountain milk-vetch habitat. This species appears to be primarily occurring in areas with recent disturbance. BLM efforts to reduce disturbance may reduce the spread of black mustard.

CONCLUSION

In the 2014 12-month finding, we determined that reclassifying the Lane Mountain milk-vetch from endangered to threatened was not warranted. Since 2014, we received new information on the occurrences and threats to the species. Based on currently available information, there are 21 occurrences of Lane Mountain milk-vetch within four extant populations. No occurrences have been extirpated or possibly extirpated since listing. However, plant abundance in 2021 was very low, continuing the declining population trend discussed in our 2014 species report (Service 2014a, p. 31). After reviewing the best available scientific information, we conclude that Lane Mountain milk-vetch remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Act and analysis of the status of the species in our 2014 12-month finding remains an accurate reflection of the species current status.

RECOMMENDATIONS FOR FUTURE ACTIONS

We recommend that the following actions be completed over the next 5 years to enhance habitat and manage threats to Lane Mountain milk-vetch. Conservation of this species will require cooperation and coordination with partners.

1. Develop and conduct Lane Mountain milk-vetch restoration projects to enhance depleted or disturbed sites and expand the species' distribution. Assess future site suitability based on climate projections. Collect seed and evaluate restoration techniques such as bulk seed growing, direct seeding, and pelletized seeding.

2. Collect seed from areas of Fort Irwin which may be impacted by training expansion.

3. Evaluate the effects of recent drought on the distribution of Lane Mountain milk-vetch. Re-inventory EOs at the lowest elevations and driest aspects to determine whether the distribution may have changed.

4. Support Bureau of Land Management route restoration efforts to ameliorate the effects of unauthorized OHV use on Lane Mountain milk-vetch.

5. Protect Lane Mountain milk-vetch populations from new mining activities by completing the previously proposed minerals withdrawal.

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FIELD OFFICE APPROVAL

Lead Field Supervisor, Fish and Wildlife Service

☒ Approved

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