

**Lane Mountain milk-vetch  
(*Astragalus jaegerianus*)**

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



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

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**5-YEAR REVIEW**  
**Lane Mountain milk-vetch (*Astragalus jaegerianus*)**

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**5-YEAR REVIEW**  
**Lane Mountain milk-vetch (*Astragalus jaegerianus*)**

**1. GENERAL INFORMATION**

**1.1. Reviewers**

Lead Regional Office: Region 8, Sacramento, California

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Lead Field Office: Ventura Fish and Wildlife Office

Constance Rutherford, Listing and Recovery Coordinator for Plants (805-644-1766 x306)

**1.2. Methodology used to complete the review:**

This review was completed by staff in the Ventura Fish and Wildlife Office, U.S. Fish and Wildlife Service (Service). Information was gathered from a variety of sources, including agency reports and coordination with staff from the National Training Center and Fort Irwin (Department of the Army [Army]), and the Bureau of Land Management (Bureau), Barstow Field Office. The most important sources of new information consist of the following: 1) research carried out by the University of California, Los Angeles, under contract to the Army on the life history of the species; 2) research carried out by other entities (California State University, San Bernardino, on genetics; and other contractors on pollination ecology); and 3) long-term population monitoring carried out by the Army.

**1.3. Background:**

**1.3.1. FR Notice citation announcing initiation of this review:**

The FR notice initiating this review was published on March 22, 2006 (71 FR 14538). This notice opened a 60-day request for information period, which closed on May 22, 2006. A second FR notice was published on April 3, 2006 (71 FR 16584), which corrected an error in a mailing address provided in the March notice.

**1.3.2. Listing history**

Original Listing

FR notice: 63 FR 53596

Date listed: October 6, 1998

Entity listed: species (*Astragalus jaegerianus*)

Classification: endangered

**1.3.3. Associated rulemakings**

FR notice: 70 FR 18220 (April 8, 2005)  
Critical habitat designation process completed, with zero acres designated for *Astragalus jaegerianus*.

**1.3.4. Review History**

No formal review has been completed. However, the status of the species was reviewed during preparation of the proposed critical habitat designation published on April 6, 2004 (69 FR 18018).

**1.3.5. Species' Recovery Priority Number at start of 5-year review:**

None has been assigned.

**1.3.6. Recovery Plan or Outline**

**Name of plan or outline:**

None

**2. REVIEW ANALYSIS**

**2.1. Application of the 1996 Distinct Population Segment (DPS) policy**

The Endangered Species Act (Act) defines species as including any subspecies of fish or wildlife or plants and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

**2.2. Recovery Criteria**

**2.2.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?**

Yes

No

**2.3. Updated Information and Current Species Status**

**2.3.1. Biology and Habitat**

*Astragalus jaegerianus* is a cryptic perennial species that typically twines up through a host shrub that it uses for structural support. 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 years with little rainfall, taproots may remain dormant, and few plants will be visible. In years with more rainfall, individuals may grow vegetatively and produce seed to varying degrees depending on other factors (Sharifi et al. 2006).

***Distribution***

At the time of listing, *Astragalus jaegerianus* was known from four general areas in a portion of the west Mojave Desert north of the city of Barstow in San Bernardino County, California. The populations are arrayed more or less linearly along a 20-mile-long (32-kilometer) axis (see map). Due to extensive surveys conducted by the Army in 2001, the distribution of all the populations is better understood (Charis Corporation 2002). Two of the four previously known populations were found to comprise a continuous population (Montana-Brinkman), and another population (Goldstone) was discovered at the northern extent of the species’ range. The most southern of the four previously known populations (Coolgardie) was found to cover a larger area than previously known. Based on recent genetic studies (see below), the Coolgardie population comprises two genetically distinct but closely related populations. However, because these two populations are geographically contiguous, we are including them both in our reference to the Coolgardie population in this review. Most of the distribution of *Astragalus jaegerianus* occurs on Federal lands. The Goldstone, Montana-Brinkman, and Paradise populations are either entirely or mostly on Department of Defense (DOD) lands at Fort Irwin. A small portion of the Paradise population and most of the Coolgardie population occur on public lands managed by the Bureau of Land Management. A small portion of the Coolgardie population occurs on private lands. Since 2005, about half the acreage previously under private ownership has been acquired by DOD.

The four general areas in which *Astragalus jaegerianus* occurs comprise approximately 21,400 acres (8,660 hectares). The number of acres and number of individuals found during surveys in 2001 within each of the four areas (acres rounded to the nearest 100), is shown in Table 1 below (from Charis Corporation 2002):

<b>Population</b>	<b>Extent in Acres (hectares)</b>	<b>Number of Individuals located</b>
Goldstone	1,280 ( 518)	555
Montana-Brinkman	5,500 (2,227)	1,487
Paradise	4,790 (1,938)	1,667
Coolgardie	9,780 (3,958)	2,014
Total	21,350 (8,640)	5,723

Table 1: Summary of 2001 milk-vetch surveys by population

***Abundance***

Due to the cryptic nature of the species, which makes it difficult to detect, only several hundred individuals had been located at the time the species was listed in 1998 (63 FR

53596). With the extensive surveys sponsored by the Army in 2001 (Charis Corporation 2002), surveyors were able to locate substantially more individuals in all four populations (see Table 1 above). The Army surveys used a transect method that sampled all known occupied habitat. Due to the spacing between transect lines within occupied habitat, the total number of individuals likely is far greater.

### ***Population trends and demography***

Since the extensive surveys in 2001, the Army has initiated long-term monitoring on a series of plots located in each of the four *Astragalus jaegerianus* populations. Data are not yet available from this monitoring effort. Another set of long-term plots has been monitored by researchers from the University of California, Los Angeles, since 1999. They have observed a 77 percent decline in the number of living individuals within the plots in the Montana-Brinkman and Goldstone populations since then (Prigge et al. 2006). Estimates from several of these studies indicate that the maximum lifespan of an individual may be on the order of 15 years, though many will not reach that age (Rutherford, in litt. 2005; Prigge et al. 2006). A minimum amount of annual rainfall may be needed to sustain established individuals; otherwise, the number of individuals may slowly dwindle. In addition, extensive recruitment may only occur in years with the most favorable climatic conditions (amount and timing of rainfall), which are tied to long-term weather patterns (possibly El Niño events) and are therefore episodic. Changes in rainfall cycles due to global warming may not only affect the frequency of favorable years for *A. jaegerianus* recruitment and reproduction, but also for the persistence of the host shrubs on which it depends.

In addition to tracking adults, Rundel et al. (2005) have monitored the fate of seedlings in several monitoring efforts. In April 2003, a total of 82 seedlings were found within long-term plots. By October 1, only six of these had survived, and by spring of 2004, all had perished. Current annual monitoring indicates that the number of reproductive individuals and the number of seedlings that have become reproductive individuals have both declined since the year 2001 (Rundel et al. 2005).

### ***Seed and germination characteristics***

Seed and germination characteristics have been studied in a greenhouse setting as well as in the field. Seed production varied by individual under greenhouse conditions, with a few plants producing the vast majority of the seed. Under controlled greenhouse conditions, 100 percent germination was achieved of seeds that had been scarified, provided sufficient water, and maintained weed-free (Rundel et al. 2005). However, under field conditions, seed production and seed germination rates are low compared to those under greenhouse conditions, even in the most favorable years (see “Population trends and demography” above).

### ***Pollination ecology***

Two studies on the pollination ecology of *Astragalus jaegerianus* were conducted between 2002 and 2005 (Kearns 2003; Hopkins 2005). Six insect taxa have been observed on the plant, though some are considered nectar and pollen robbers and do not effect pollination. The most abundant insects observed that are likely effective

pollinators included the leaf-cutter and metal leaf-cutter bees (*Anthidium dammersi*, *A. emarginatum*, and *Osmia laticulata*). Under greenhouse conditions, Rundel et al. (2005) found that the number of flowers producing seed resulting from both self-pollination and cross-pollination manipulations was higher (40 and 30 percent, respectively) than the number of flowers producing seed without being pollinated (8 percent); these results support the importance of pollinators in achieving seed production.

### ***Disease and predation***

#### Vegetative predation:

Snipping of *Astragalus jaegerianus* branches by small mammals has been observed by many field workers (Hopkins 2003; C. Rutherford, U.S. Fish and Wildlife Service, pers. obs. 2003; M. Hessing, Fort Irwin botanist, pers. obs. 2005). The presence of scat from jackrabbits (*Lagomorphus* sp.) suggests that they may be responsible for such damage. Phloem-sucking aphid swarms have been observed on individual *A. jaegerianus* plants (Hopkins 2003; C. Rutherford, pers. obs. 2003; M. Hessing, pers. obs. 2005).

Observations indicate that damage of both kinds may be heavy on individual plants, but does not appear to be widespread within the population.

#### Seed predation:

Sharifi (Sharifi et al. 2006) observed that seeds in both the field and in the greenhouse are being utilized by bruchid wasps. Females lay eggs in the unripe plant ovaries, which are then consumed by the emerging wasp larvae.

#### Root predation:

Under greenhouse conditions, Sharifi (University of California, Los Angeles, pers. comm. 2006) reported that 70 plants died after fly larvae hatched and consumed the root systems. Although this factor may be a concern for future propagation efforts, the drier desert conditions would likely preclude this kind of damage from occurring under natural conditions.

### ***Dust effects***

In anticipation of secondary impacts of military training on *Astragalus jaegerianus*, a study was conducted on the effects of dust on the plant's growth (as measured by leaf length) and rate of photosynthesis. Results indicated that applications of dust did not affect leaf growth and photosynthesis increased; however, shoot length decreased (Wijayratne et al. 2004). Researchers hypothesize that heavily dusted plants compensate by putting more effort into new leaves and reducing the availability of resources for shoot growth.

### ***Habitat characteristics***

New information on habitat characteristics consists of more detailed descriptions of what was generally known at the time of listing. Because *Astragalus jaegerianus* is difficult to observe in the field, researchers and surveyors have made efforts to model suitable habitat to assist with determining the extent of every population. Our current understanding of habitat characteristics is as follows: 1) most (88 percent) individuals occur between 1,026 meters (3,365 feet) and 1,175 meters (3,854 feet) in elevation

(Charis Corporation 2003b); 2) most individuals occur on shallow, well-drained soils derived from either Jurassic or Cretaceous granitic bedrock (90 percent) or diorite or gabbroid bedrock (9 percent) (Prigge et al. 2000; Charis Corporation 2003b); 3) the mixed desert scrub vegetation where *A. jaegerianus* occurs has a higher diversity of species and higher percent cover than adjacent areas that do not support *A. jaegerianus* (Prigge et al 2000); and 5) *A. jaegerianus* differentially uses certain shrub taxa as hosts as compared to their abundance in the plant community, with California buckwheat (*Eriogonum fasciculatum*), burrobush (*Ambrosia dumosa*), turpentine bush (*Thamnosma montana*), Mormon tea (*Ephedra nevadensis*), goldenbush (*Ericameria cooperi* var *cooperi*), and dead shrubs accounting for 75 percent of the host plants (Prigge et al. 2000; Charis Corporation 2002).

### ***Habitat or ecosystem conditions***

#### **Long-term planning and future land use:**

Several large-scale changes in land use are underway and will affect the future conservation of *Astragalus jaegerianus*. In 2002, President Bush signed legislation that transferred approximately 118,674 acres (48,026 hectares) of land, formerly managed by the Bureau of Land Management, for military use at the Army's National Training Center (NTC). Two of the four populations of *A. jaegerianus* (Brinkman Wash-Montana Mine and Paradise Wash) occur almost entirely on withdrawn lands within the NTC expansion. Military training activities with wheeled and tracked vehicles will affect portions of the Brinkman Wash-Montana Mine and Paradise Wash populations starting in the year 2009 (Charis Corporation 2003a; Service 2004).

The Army has established two conservation areas for *Astragalus jaegerianus* in areas that will not be subject to training use. The first conservation area comprises 2,470 acres (1,000 hectares) at the Goldstone site. The second conservation area, referred to as Paradise Valley Conservation Area, comprises 4,302 acres (1,741 hectares) along the southwestern boundary of NTC. A third area, referred to as the "no dig" zone, supports a portion of the *A. jaegerianus* population at the Brinkman Wash site; only non-ground-disturbing activities will be allowed within this 2,000-acre (809 ha) area.

The Bureau recently amended the California Desert Conservation Area Plan to include the West Mojave Plan that directs management of approximately 3,000,000 acres (1,214,062 hectares) of the western Mojave Desert (Bureau 2005); this area includes approximately half the distribution of *Astragalus jaegerianus* in the southern portion of its range, including the Coolgardie site and a portion of the Paradise site. The Bureau established two conservation areas for *A. jaegerianus* on lands it manages. The West Paradise Conservation Area comprises 1,243 acres (503 hectares), and is contiguous with the Army's Paradise Valley Conservation Area along the southwestern boundary of Fort Irwin. The second is the Coolgardie Mesa Conservation Area, which comprises approximately 13,354 acres (5,404 hectares) at the Coolgardie site. Both conservation areas will be managed to maintain habitat for *A. jaegerianus*. Many of the private lands within the area covered by the West Mojave Plan have been acquired by the Army in the last 2 years and will eventually be transferred to the Bureau.

#### Off-road vehicle use:

Off-road vehicle use has increased in one portion of the Coolgardie site over the past 10 years, creating a barren area of approximately 20 acres (8 hectares) where *Astragalus jaegerianus* used to occur (Hessing, *in litt.* 2006). In 2006, the Service funded the acquisition of equipment and material to allow the Bureau to install 2 miles (3.2 kilometers) of fencing to secure sites from additional damage and to initiate restoration activities. Off-road vehicle use has also increased in the Paradise area during this time (C. Rutherford, pers. obs. 2006); however, since this land has been transferred to the Army, this use will no longer occur.

#### ***Genetics***

Walker and Metcalf (2005a, 2005b) reached several conclusions based on recent genetic studies. First, the use of DNA sequencing within chloroplast and nuclear genomes of *Astragalus jaegerianus* did not detect genetic variation within or between populations. This lack of variation is in contrast to two other sympatric (but more widespread) species of *Astragalus* that were also tested (Walker and Metcalf 2005a). However, by using a different technique that used amplified fragment length polymorphic (AFLP) markers, genetic similarity indices were generated for all populations of *A. jaegerianus*. Within-population genetic variation was lowest for the Lane Mountain/Coolgardie populations (southernmost) and was highest for the Goldstone population (northernmost). Next, of the total genetic variation observed, most of it (87 percent) was attributed to differences within populations, while the rest (13 percent) was attributed to differences among populations. This finding supports the hypothesis that the species has a well-defined population structure across its range with limited gene flow. A fourth finding is that what has been referred to as one population in the Coolgardie area shows there are two populations that are genetically dissimilar to each other, albeit more similar to each other than to any of the other populations. Finally, an estimation of gene flow between populations (or number of migrants through seed dispersal per generation) supports the isolation-by-distance model (i.e., the populations closest to each other have the greatest amount of gene flow) (Metcalf and Walker 2005b).

#### ***Taxonomy***

No name changes or changes in taxonomic relationship have been made since the listing.

### **2.3.2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)**

#### **2.3.2.1. Present or threatened destruction, modification or curtailment of its habitat or range:**

At the time of listing in 1998, the primary threats identified to habitat for *Astragalus jaegerianus* were surface mining, off-highway vehicle recreation, and military training activities (63 FR 53596). All of these threats still exist, and are further discussed below.

### Mining:

The Coolgardie area was recognized in the California Desert Conservation Area Plan (Bureau 1980) as having a high mineral potential. Although the area is laced with historic exploratory mine pits, no large commercial operations have become established. Most of the current mining claims are held by members of “mining clubs” that engage in small-scale recreational gold mining. The effects of such surface disturbance are cumulative, even though the size of these mining operations falls below the threshold that would require the claimholder to file a plan of operations, including restoration, with the Bureau. The extent of the overlap between mining claims and patches of *Astragalus jaegerianus* has not been determined.

The Bureau’s West Mojave Plan calls for the withdrawal of the two Areas of Critical Environmental Concern (ACECs) from future mineral entry (Bureau 2005). However, such a minerals withdrawal does not limit use of valid existing claims or of unvalidated claims if the disturbance to natural resources is under a defined threshold value. Therefore, a minerals withdrawal of ACECs may benefit *Astragalus jaegerianus* by reducing habitat impacts from mining; the specific locations where withdrawal would provide a benefit have not yet been determined.

### Off-road vehicle recreation:

Since the time of listing, unauthorized off-road vehicle use has increased within the Coolgardie and Paradise areas. Although most of the increased use has been dispersed in nature, one area on the west side of Coolgardie sustained a large increase in concentrated use. As a result of the recent approval of the Bureau’s West Mojave Plan (Bureau 2005), efforts to install protective fencing in this area, the closure of excess roads, and a public education program, we anticipate that off-road vehicle use in this area will decrease in the near future.

### Military training activities:

Training activities are scheduled to commence in the year 2009. These activities will affect approximately 4,600 acres (1,862 hectares) and 20 percent of the known distribution of the species. Due to the nature of the training activities (force-on-force tank maneuvers), habitat for *Astragalus jaegerianus* will likely be adversely affected over a period of years. Pockets of habitat that support *A. jaegerianus* within the Montana-Brinkman and Paradise populations may persist for several decades even after training commences, particularly in portions of the training area that are rocky and where tanks are less likely to go. However, over time, the remaining habitat will become more fragmented and these individuals will become reproductively isolated from the rest of the population and cease to contribute to the long-term persistence of the species. The remaining distribution of the species on Fort Irwin will be managed for conservation by the Army as discussed under “Habitat or ecosystem conditions” above.

### Energy development activities:

The Bureau has recently received recent expressions of interest from wind energy companies that are seeking sites for wind energy development; one such inquiry was

made concerning the Coolgardie area. The development of wind farms within habitat for *Astragalus jaegerianus* would most likely alter the habitat such that the long-term persistence of the species would be compromised. Current prescriptions for management of the ACEC that are included in the West Mojave Plan state that the Bureau will not issue permits that would allow the “take” of the species (Bureau 2005).

Summary of habitat threats:

Almost all the distribution of *Astragalus jaegerianus* occurs on Federal lands managed by the Army and the Bureau. Through the Army’s INRMP, all of the Goldstone population and approximately three quarters of the Paradise population will be under conservation management. In addition, approximately one third of the Montana-Brinkman population will be under a limited use designation. Approximately two-thirds of the Montana-Brinkman population and one-quarter of the Paradise population will be subjected to military impacts beginning in 2009.

Through the Bureau’s West Mojave Plan, all of the Coolgardie population and a sliver of the Paradise population (contiguous with that on Army land) have been designated as ACECs and will be in conservation management. The Bureau has already initiated actions to fence and sign specific sites and roads as closed within the ACECs.

Population	Extent in acres (hectares)	Acres (hectares) within designated DOD conservation areas or BLM ACEC)	Acres (hectares) within limited use area	Per cent (%) of areal extent of population within limited use or conservation areas
Goldstone	1,280 ( 518)	1, 280 ( 518)		100
Montana-Brinkman	5,500 (2,227)		2,000 (809)	36
Paradise	4,790 (1,938)	3,630 (1,469)		76
Coolgardie	9,780 (3,958)	9,780 (3,958 )		100
Total	21,350 (8,640)	16,690 ( 6,754 )		78

Table 2: Amount of each population (by acreage) under conservation management or limited use management.

**2.3.2.2. Overutilization for commercial, recreational, scientific, or educational purposes:**

This was not identified at the time of listing as a threat, and is not currently considered a threat.

**2.3.2.3. Disease or predation:**

At the time of listing, disease or predation was not considered a threat. Since the time of listing, several instances of predation have been observed during the course of field

and greenhouse studies. This information is detailed under “Biology and Habitat” above. In summary, predation of leaves, stems, seeds, and roots are now known to occur.

Many small mammals, including antelope ground squirrels (*Spermophilus leucurus*), Mohave ground squirrels (*Spermophilus mohavensis*), pocket mice (*Perognathus* sp.), and kangaroo rats (*Dipodomys* sp.), are known to consume as well as cache seed (Martin et al. 1961; Gustavson 1993 in Defenders of Wildlife 2005). Although we have no direct evidence pertaining to *Astragalus jaegerianus*, its seeds are likely used by small mammals and birds in the area.

#### **2.3.2.4. Inadequacy of existing regulatory mechanisms:**

At the time of listing in 1998 (63 FR 53596), an array of regulatory mechanisms and their varying potentials for providing protection to *Astragalus jaegerianus* were discussed, including ESA protections invoked for the federally threatened desert tortoise (*Gopherus aggasiz*) in areas where its range overlapped with that of *A. jaegerianus*; the Federal Land Policy and Management Act; and regional planning efforts, specifically the California Desert Conservation Area Plan (Bureau 1980). Of particular concern was the limited ability of the Bureau to regulate surface mining on public lands claimed under the Mining Laws of 1872.

Since the time of listing, several changes have occurred. Approximately half the habitat that supports *Astragalus jaegerianus* was transferred from the Bureau to the Army at the direction of President Bush on January 11, 2002 (P.L. 107-107). Of the acreage that supports *A. jaegerianus*, 3,340 acres (1,352 hectares) will be used for high-intensity military training, 2,000 acres (809 hectares) will be used for medium-intensity military training, and 6,772 acres (2,740 hectares) will be fenced off and designated as conservation areas in Goldstone (2,470 acres [1,000 hectares]) and East Paradise (4,302 acres [1,741 hectares]). The Army has recently completed an Integrated Natural Resources Management Plan for Fort Irwin that more specifically outlines the management prescriptions for each of these areas (U.S. Department of the Army 2006).

The Bureau has completed a California Desert Conservation Area (CDCA) Plan amendment, referred to as the West Mojave Plan (Bureau 2005). Through the West Mojave Plan, habitat for the Coolgardie population of *Astragalus jaegerianus* and the westernmost fringe of the Paradise population were designated as an Areas of Critical Environmental Concern (ACECs), and the Bureau committed to management prescriptions for these areas (Bureau 2005). Although the Bureau recommended withdrawing the ACECs from further mineral entry, the rights to existing mining claims still stand unless subject to an invalidation process by the Bureau. Therefore, threats to *A. jaegerianus* from mining activity may remain at specific locations.

### **2.3.2.5. Other natural or manmade factors affecting its continued existence:**

#### Effects of fire:

At the time of listing, the threat of fire due to an increase in fuel load contributed by non-native species was considered a threat, particularly for the Coolgardie population of *Astragalus jaegerianus* due to its closer proximity to human activities, which can be the source of both the increase in non-native species and the ignition source. Non-native grasses such as schismus (*Schismus* spp.) and bromes (*Bromus* spp.) have been shown to carry fire in the western Mojave Desert (Brooks 1999). Ongoing research supports the theory that desert ecosystems were not adapted to burn frequently, and are unable to regenerate as easily as fire-adapted plant communities (Brooks 1999; U.S. Geologic Survey 2005). We believe an increase in fires would likely alter the composition of the vegetation community and reduce the number of host shrubs available to support *A. jaegerianus*.

#### Infrequent recruitment:

Although the total number of *Astragalus jaegerianus* individuals is much larger than that known at the time of listing, ongoing research indicates that substantial recruitment may occur in only the most favorable years (Rundel et al. 2005). Patches of plants may die out prior to being replaced if the interval between substantial recruitment events is too long. Within the Coolgardie population, patches of plants that were visible in the early 1990s have not been seen in the last 5 years (C. Rutherford, pers. obs. 2006). In addition, in a series of unfavorable years, not only would recruitment be low, but extant plants that are persisting as dormant underground rootstalks would be spending more resources on maintaining vegetative biomass rather than using it for reproduction in the future. In long-term plots, the number of living plants has declined between 1999 and 2005 (Rundel et al. 2005; Sharifi et al. 2006).

#### Increase of non-native species:

Non-native plant species have increased in abundance across the Mojave Desert with the increase and spread of human activities. Species including schismus and bromes can occur beneath the canopy of shrubs, or in interspaces between shrubs, and can increase the probability that fires will carry across the desert landscape (Brooks 1999). If fire frequency increases, the shrubs that serve as hosts to *Astragalus jaegerianus* could become less common over time and provide fewer sites for individuals to persist.

A second threat to *Astragalus jaegerianus* posed by non-native grasses is competition for space, light, and nutrients during the seedling stage. Researchers have observed that bromes beneath the shrub canopy were so dense that they had overtaken *A. jaegerianus* seedlings (R. Sharifi, pers. obs. 2006; B. Prigge, pers. obs. 2006; C. Rutherford, pers. obs. 2006), making it unlikely the seedlings would be able to survive to adulthood.

## 2.4. Synthesis

Since the time of listing, new information indicates that *Astragalus jaegerianus* occurs in much greater abundance and over a slightly larger range than previously known. Research has also added to our understanding of the life history of the species. We have observed that the species has the potential to express large numbers of individuals in years with favorable climatic conditions, while in other years, reproduction may be very low. The species currently appears to be in a downward trend since 2001. Because substantial recruitment may be an episodic event that occurs on the order of once every 10 to 15 years, long-term persistence of populations may depend on maintaining sufficient numbers of reproductive individuals to build up a soil seed bank available for the next recruitment event. A large degree of uncertainty is therefore associated with how weather patterns will affect the long-term persistence of the species.

At the time of listing, the primary threats to *Astragalus jaegerianus* habitat were surface mining, off-highway vehicle recreation, non-native species, and military training activities. Of these, military training activities pose the greatest threat, with such activities scheduled to commence in approximately 20 percent of the species' habitat in 2009. The Army has planned for the conservation of approximately 30 percent of the range of the species, including the establishment of two conservation areas and a third area that will be subject to some disturbance but not tank training. The Bureau has planned for the conservation of the remaining 50 percent of the habitat of the species that occurs on their lands through the establishment of two Areas of Critical Environmental Concern, though some uses, including mining, will still occur within these areas. These planning processes by the Army (INRMP) and the Bureau (West Mojave Plan) have increased the level of certainty regarding the future management of the species, to the extent practical and feasible, throughout the remaining portion (78 percent) of its range that will either not be impacted by military training, or be subject to low-impact activities (in the no dig zone).

We believe that *Astragalus jaegerianus* no longer meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range). Even though 20 percent of the range of the species will likely be extirpated due to planned military activities, most of the remaining habitat has been placed under various conservation designations, as discussed above. In addition, larger numbers of individuals are known now than were known at the time of listing.

We believe that *Astragalus jaegerianus* meets the definition of a threatened species (a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range). This is an appropriate designation for several reasons. First, although there is a much larger number of individuals known now than were at the time of listing, monitoring indicates the number of adult individuals and the number of newly recruited individuals has been decreasing since 1999. Second, although 70 percent of the habitat of the species will not be subject to high- and medium-intensity military training and an additional 9 percent will be subject to limited military training (the no-dig zone), the 23 percent of the habitat that will be subject high- and medium-intensity training includes portions of two populations in the middle of the species' range and will therefore further fragment connectivity between the Goldstone and Montana-Brinkman populations, and the

Montana-Brinkman population and the Paradise population. Third, because the life history of this species includes episodic germination events that appear to be tied to medium- and large-scale weather patterns and patch die-offs have been observed, there is a high level of uncertainty regarding the ability of the species to persist through local extirpations and recolonization of suitable habitat.

### 3. RESULTS

#### 3.1. Recommended Classification

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

**3.2. New Recovery Priority Number:** 8. This denotes a species with a moderate degree of threat and a high potential for recovery. Note, however, in choosing between a high potential and a low potential for recovery, choosing a high potential for recovery includes a high degree of uncertainty.

#### 3.3. Listing and Reclassification Priority Number, if reclassification is recommended:

N/A

Reclassification (from Threatened to Endangered) Priority Number: \_\_\_\_

Reclassification (from Endangered to Threatened) Priority Number: 6

Delisting (Removal from list regardless of current classification) Priority Number: \_\_\_\_

Brief Rationale: According to priorities for delisting and reclassification from endangered to threatened, a priority 6 indicates the reclassification would have a low management impact, and is an unpetitioned action.

### 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. Continue to work cooperatively with the Army and the Bureau to ensure that we are supporting them in carrying out monitoring and management actions that have been called for in the Integrated Natural Resources Management Plan and the West Mojave Plan.

2. Assess recruitment rates across all four populations. Most of these efforts are currently focused within the Montana-Brinkman population. Comparison of recruitment rates across all populations is important to determine whether low recruitment is a concern at all sites.
3. Carry out research on soil seed bank ecology to assist in understanding patch dynamics within each population, including assessment of the presence and abundance of seed banks at all four populations and determination of the longevity and viability of seed.
4. Carry out research on short- and long-distance seed dispersal. Determine if small mammals are utilizing and dispersing seed, and if so, the proportion that is consumed (and lost) and the proportion that is cached.
5. Store seed from all four populations (including the two genetically different populations at Coolgardie) in a long-term seed-storage facility sponsored by the Center for Plant Conservation, to hedge against local extirpations.

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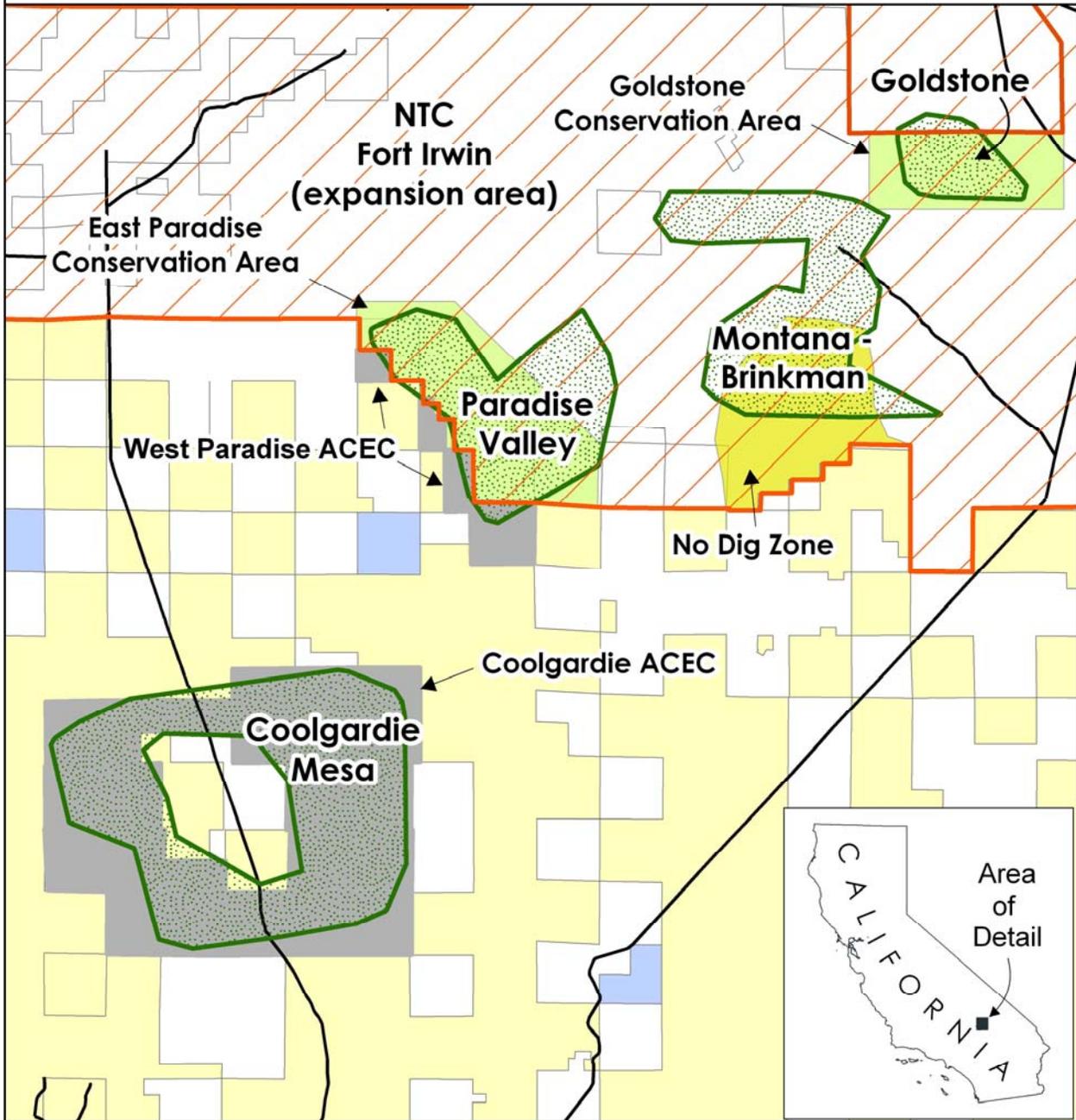
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# Location of Lane Mountain Milk-Vetch Populations with Land Use Designations



0 0.5 1 2 3 4 Miles

Lane Mt. Milk-Vetch Populations

Roads

U.S. Fish & Wildlife Service  
Ventura Fish & Wildlife Office  
July, 2008

### Land Ownership

- Ft. Irwin
- BLM Administered Lands\*
- State Lands

### Land Use

- BLM ACEC
- DOD No Dig Zone
- DOD Conservation Areas

\* Land Ownership does not reflect recent purchases by DOD

**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of Lane Mountain milk-vetch (*Astragalus jaegerianus*)**

**Current Classification:** Endangered

**Recommendation resulting from the 5-Year Review:**

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:** 6

**Review Conducted By:** Connie Rutherford

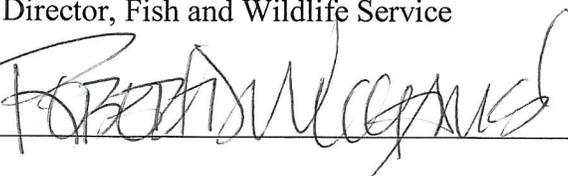
**FIELD OFFICE APPROVAL:**

Field Supervisor, Fish and Wildlife Service

Approve  Date 7/2/08

**REGIONAL OFFICE APPROVAL:**

Regional Director, Fish and Wildlife Service

Approve  Date 7/10/08