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5-Year Review Short Form

Species Reviewed: Shivwits milk-vetch (*Astragalus ampullarioides*)

Federal Register Notice Announcing Initiation of this Review: May 27, 2016. Endangered and threatened wildlife and plants; 5-year status reviews of 21 species in the Mountain Prairie Region (84 FR 33698).

Current Classification: Endangered

Current Recovery Priority: 5C

This recovery priority ranking is indicative of a species with a high degree of threat, imminent conflicts with land development, and a relatively low potential for recovery.

Methodology used to complete this review:

This review was completed by the Utah Ecological Services Field Office on July 22, 2021. All pertinent literature and documents on file at the Utah Ecological Services Field Office were used for this review, including new information obtained since the last status review. This includes the following new information obtained since 2007: a new Bureau of Land Management (BLM) monitoring protocol (Meyer et al. 2019), population monitoring information for four of the six populations (Meyer et al. 2020; Houghton 2021; Schrage 2021; Service 2021), a new seed propagation protocol (Schrage and Dilley 2020), new research on the population genetic structure (Breinholt et al. 2009) and seed bank characteristics of the species (Searle 2011).

Review Summary:

Shivwits milkvetch is an herbaceous perennial of the legume (Fabaceae) family that is endemic to Washington County, Utah, between 3,018 to 4,367 feet (ft) (920 to 1,330 meters (m)) in elevation (Service 2006a). Plants are medium-sized, with flowering stalks usually between 18 to 20 inches (in) (20 to 50 centimeters (cm)) but occasionally up to 40 in (one m) tall in the absence of grazing (Service 2001). Individual plants produce between 25 and 270 cream-colored flowers on multiple flowering stems (up to 45 flowers per stem) from April to May (Tepedino 2005). Fruits are short, broad pods between 0.3 to 0.6 in (0.8 to 1.5 cm) long and 0.2 to 0.5 in (0.6 to 1.2 cm) wide (Service 2006a). Shivwits milkvetch reproduces sexually by seeds and is not known to be clonal. The species is capable of self-pollination; however, seed production is much more successful when plants are cross-pollinated (Tepedino 2005). Typical pollinators of this species are native, ground nesting solitary bees in the families Apidae and Megachilidae and the introduced honeybee *Apis mellifera* (Tepedino 2005). The plant dies back to its root crown after flowering and can remain dormant for multiple years until there is sufficient rainfall to reemerge (Service 2006a). Seeds remain viable in the seed bank for an estimated four years; approximately 65 percent germinate in the first year after they are produced (Searle 2011; Meyer 2021). Unlike most *Astragalus* species, Shivwits milkvetch is highly palatable to domesticated and wild herbivores (Service 2006a).

Shivwits milkvetch grows primarily on isolated pockets of purple-hued soft clay soil found on the Petrified Forest Member of the Chinle formation. A portion of the Shivwits population grows on a different soil type, the Dinosaur Canyon Member of the Moenave Formation (Miller et al. 2007). Where Shivwits milkvetch occur, the soils' key characteristics are they are delicate and unstable when dry and glue-like when wet. Habitat is sparsely vegetated with an average of 12 percent cover (Service 2006a). Associated native plant species include forbs (herbaceous perennial plants) such as hairy deer vetch (*Lotus humistratus*), woolly plantain (*Plantago patagonica*), sego lily (*Calochortus flexuosus)* and bluedicks (*Dichelostemma pulchellum*); native grasses, such as big galetta (*Hilaria rigida*) and alkali sacaton (*Sporobolus airoides*); and shrubs, such as blackbrush (*Colegyne ramosissima* and broom snakeweed (*Gutierrezia microcephala*) (Service 2006b).

We listed Shivwits milkvetch as endangered in September 2001 (66 FR 49560, September 28, 2001) under the Endangered Species Act of 1973 (Act), as amended (56 FR 56882). The total range-wide number of individuals was approximately 1,000 individuals in five populations at that time (Service 2001). Threats facing the species were recreational land uses (including off-road vehicle (ORV) use), invasive plants and associated wildfires, mineral development, and herbivory (Service 2001). In 2006, we designated total of 2,421 acres (ac) (980 hectares (ha)) of critical habitat (71 FR 77972, December 27, 2006) (Service 2006b) and completed a final recovery plan (Service 2006a). In the recovery plan, we revised our initial five population delineation into six recovery populations based on NatureServe criteria (NatureServe 2004; Service 2006a). Four populations occur on Federal land (National Park Service and BLM), one population occurs on private land, and one population occurs on Tribal land (Shivwits Band of the Paiute Tribe) (Service 2006a).

The latest range-wide estimate for Shivwits milkvetch is 4,000 – 5,000 individuals in six populations; approximately 83 percent of known individuals occur in the Zion population (Service 2021). The Zion population has shown overall stable population trends since monitoring began in 2006, though counts were low in 2018 and 2021, likely due to drought conditions (Schrage 2021, Service 2021). A recent analysis of the long-term population data (1998 to 2019) available for two populations (Harrisburg Bench and Cottonwood, and Pahcoon Spring Wash) on BLM lands identified declining trends due to small mammal herbivory and possible inbreeding depression (Breinholt et al. 2009; Rominger et al. 2019). Researchers developed and implemented a new monitoring protocol on BLM lands to perform a complete census (counting all plants) at the three BLM populations (Pahcoon Spring Wash, Harrisburg Bench and Cottonwood, and Silver Reef) in 2019 (Meyer et al. 2019). Plant abundance increased at all three populations in 2020, but very few individuals were found at these populations in 2021, possibly due to exceptional drought conditions (Meyer et al. 2020, Houghton 2021). No population trend information is available for the Shivwits and Coral Canyon populations (Service 2021).

Four populations (Zion, Pahcoon Spring Wash, Harrisburg Bench and Cottonwood, and Silver Reef) are on Federal land within designated critical habitat and three of those (Pahcoon Spring Wash, Harrisburg Bench and Cottonwood, and Silver Reef) are fenced to exclude livestock grazing, and recreation including ORV use (Meyer et al. 2020). These protections do not eliminate small mammal herbivory, which has been known to significantly reduce reproductive success (Miller et al. 2007; Searle 2011; Rominger et al. 2019; Meyer et al. 2019; Meyer et al.

2020; Houghton 2021; Service 2021). Caging individual plants in wire mesh can ameliorate this threat somewhat but more caging may be required to reduce small mammal herbivory when implementing population augmentation efforts.

Gene flow between populations is currently low and reduced from levels of historic gene flow (Breinholt et al. 2009). The species is at risk for genetic drift and inbreeding depression and population augmentation efforts are recommended to improve genetic diversity (Breinholt et al. 2009). Additional genetic research is in progress to guide population augmentation efforts and determine whether reciprocal transplanting[1] is needed to increase genetic diversity in the three BLM populations (Pahcoon Spring Wash, Harrisburg Bench and Cottonwood, and Silver Reef) (Stevens 2021). Genetic results are expected in summer 2021 to guide planned augmentation efforts. Population augmentation efforts have been underway at the Pahcoon Spring Wash population since 2019 and are planned at all three BLM populations (Pahcoon Spring Wash, Harrisburg Bench and Cottonwood, and Silver Reef) in the fall of 2021 (Dilley 2020; Schrage and Dilley 2020). A successful propagation protocol was recently developed to support the augmentation efforts (Schrage and Dilley 2020). Limited seed availability due to low seed production and high seed herbivory are the main challenges to these efforts (Schrage and Dilley 2020).

Shivwits milkvetch occupied habitat on the Chinle and Moenave soils are small outcrops that are surrounded by different soils and habitats dominated by invasive species such as red brome (*Bromus rubens*) and cheatgrass (*Bromus tectorum*). Competition from invasive species appears to be low in most Shivwits milkvetch populations except for the Coral Canyon population (Miller et al. 2007; Rominger et al. 2019). Invasive species can increase the risk and frequency of wildfire (Fusco et al. 2019). Wildfires burned unoccupied, adjacent habitat in 2005 and 2020 within designated critical habitat but they did not burn the Chinle formation outcrops so no loss of plants occurred (Service 2006a; Root 2020).

On non-Federal lands, there are no formal protection agreements to protect the species from urban development. Since critical habitat was designated (Service 2006b), 41 acres have been lost to development on non-Federal lands in three populations (Silver Reef, Coral Canyon, and Harrisburg Bench and Cottonwood), leaving 120 remaining acres of undeveloped critical habitat on non-Federal lands (Service 2021). The species' small population size and fragile, easily damaged soils are vulnerabilities that may exacerbate the effects of identified threats.

Recommendations on species status:

After reviewing available scientific information and recovery criteria, we conclude that Shivwits milkvetch remains an endangered species. Our review of new information compiled since 2007 does not change our evaluation of the species status and threats affecting the species under the factors in 4(a)(1) of the Act from our most recent 5-year review (Service 2007). The downlisting and delisting criteria for Shivwits milkvetch are not met (Service 2006a). Therefore, we recommend no change in status.

[1] Planting propagated plants into populations other than their origin.

Recommended future actions:

Based on recent discussions with Federal agencies and conservation partners, we recommend the following future actions: (1) Continue propagation and population augmentation efforts with partners to address population declines; (2) Expand the use of cages and other conservation measures to address small mammal herbivory; (2) Complete surveys well ahead of planned development on non-Federal lands to allow for salvage, seed collection, and discussions about habitat protections; (3) Complete surveys on a Federal lands on a regular basis; (4) Expand the range-wide monitoring currently occurring on BLM and NPS lands to all populations, including populations or portions of populations occurring on non-Federal lands; (5) Evaluate the species' response to climate change; (6) Seek funding to provide need-based research aimed at abating or reducing threats; (7) Work with partners to develop conservation and management agreements that provide long-term protections for the six populations; and (8) Continue and increase communications with partners, stakeholders, and the public regarding the milkvetches' recovery needs and progress.

Approve: YVETTE CONVERSE Digitally signed by YVETTE CONVERSE Date: 2021.07.22 12:38:47 -06'00' **Date:** _____

Yvette Converse, Field Supervisor
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