

BEFORE THE SECRETARY OF THE INTERIOR

**PETITION TO LIST THE THREECONER MILKVETCH (*ASTRAGALUS GEYERI*
VAR. *TRIQUETRUS*) AS ENDANGERED UNDER THE ENDANGERED SPECIES ACT**



April 25, 2019

Notice of Petition

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NOTICE of PETITION

This is a formal petition to list threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*) as endangered pursuant to the Endangered Species Act, 16 U.S.C. 1531 et seq. (ESA).

PETITIONERS

Basin and Range Watch (BRW) is a 501(c)(3) non-profit working to conserve the deserts of Nevada and California and to educate the public about the diversity of life, culture, and history of the ecosystems and wild lands of the desert.

Western Watersheds Project (WWP) is a conservation nonprofit with more than 9,500 members and followers, that works to protect and conserve the public lands, wilderness, wildlife, and natural resources of the American West through education, scientific study, public policy initiatives, and litigation. WWP has offices and staff in Nevada, Arizona and other western states. The conservation wildlife and rare plants is important to WWP members, supporters, and staff, who appreciate and use these resources for a variety of reasons and will continue to do so into the future.

Submitted this 25th day of April, 2019. Pursuant to Section 4(b) of the Endangered Species Act (“ESA”), 16 U.S.C. § 1533(b); Section 553(e) of the Administrative Procedure Act, 5 U.S.C. § 553(e); and 50 C.F.R. § 424.14(a), Basin and Range Watch and Western Watersheds Project, hereby petition the Secretary of the Interior, through the United States Fish and Wildlife Service

(USFWS), to protect the threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*) as an endangered species and to designate critical habitat for the flower.

The USFWS has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on the Service. Specifically, the Service must issue an initial finding as to whether the petition “presents substantial scientific or commercial information indicating that the petitioned action may be warranted.” 16 U.S.C. § 1533(b)(3)(A). USFWS must make this initial finding “[t]o the maximum extent practicable, within 90 days after receiving the petition.” *Id.*

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SUMMARY

Threecorner milkvetch, *Astragalus geyeri* A. Gray var. *triquetrus* (A. Gray) M. E. Jones, is a rare, slender annual forb with bi-pinnate leaves in the pea family (Fabaceae) that grows in sandy soils in a limited region of the Mojave Desert of southeastern Nevada and adjacent Arizona.

Threecorner milkvetch is one of the rarest plants in Nevada. It is endemic to specific geologic substrates found only within a localized area of southeastern Nevada and adjacent northwestern Arizona. This taxon is rare by virtue of its limited distribution and low population numbers. Therefore, it extremely vulnerable to natural and human-caused threats.

Similar to other listed milkvetches, such as the Federally Endangered Shivwits milkvetch (*Astragalus ampullarioides*), many threats are current and many eminent. These threats involve habitat loss as a result of human disturbance; urban and commercial development in surrounding areas, the potential creation of new roads, invasive plants, proposed utility corridors, off-highway vehicle use’ and cattle grazing and trampling.

Further urbanization is being facilitated by land exchanges with the Bureau of Land Management (BLM), in a similar way to the Shivwits milkvetch threat situation.

Present mechanisms to conserve this taxon and its habitat are not effective. Large-scale solar projects are proposed in Clark County despite a Multiple Species Habitat Conservation Plan. Trespass cattle from the Bundy Ranch are trampling plants despite closure of BLM allotments to conserve sensitive species. Listing under the ESA is therefore urgently needed before additional losses are incurred, and more populations are fragmented, diminished or otherwise destroyed.

TAXONOMY

Order: Fabales

Family: Fabaceae

Genus: *Astragalus*

Species: *geyeri*

Variety: *triquetrus*

DESCRIPTION

This plant matures quickly after germination and grows upright, typically about 5 to 25 centimeters tall. Stems are a greyish green and leaflets are green. Leaflets are few per leaf, (5)7-9, and are broad, flat, and with a blunt or notched tip. The foliage is covered with short, sharp hairs. Leaflets are generally flat with stiff appressed hairs on both sides. The flowering stalks are shorter than the leaves with each forming two to 8 flowers. The flowers are whitish, sometimes with a faint, pink or lilac tint, with a recurved banner. The fruit pods are triangular in cross section, and have parallel grooves on the dorsal side and a septum forming two seed chambers. Threecorner milkvetch flowers from late winter to early spring and is thought to germinate only in wetter years.



Figure 1. Threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*), habit. (Photo: Calflora, https://calphotos.berkeley.edu/cgi/img_query?stat=BROWSE_IMG&where-genre=Plant&where-taxon=Astragalus+geyeri+var.+triquetrus&title_tag=Astragalus+geyeri+var.+triquetrus)



Figure 2. Threecorner milkvetch leaves and seed pod. (Photo: Calflora)



Figure 2. Threecorner milkvetch leaves and seed pod. (Photo: Calflora)

DISTRIBUTION

Threecorner milkvetch is known to occur only in Southern Nevada and Northwest Arizona. In Nevada, it is found only in Clark and Lincoln Counties and in Arizona it is only found in the remote northwest corner of Mohave County at Coon Creek. The westernmost populations are found in the Dry Lake Valley, California Wash, Mud Lake and Logandale in Clark County NV. The Sand Hollow Wash in Lincoln County, NV represents the northernmost population. Sandy Cove on the north shore of Boulder Basin in the Lake Mead National Recreation Area is the southernmost population known (National Park Service [NPS] 2010).

Botanical surveys for the species near Exit 118 near Mesquite, Nevada, several years ago revealed both good habitat and threecorner vilkvetch; the area is now developed.¹



Figure 4. The Nature Conservancy map of threecorner milkvetch range in Nevada. (Clark County Multi-Species Habitat Conservation Plan)

HABITAT

Threecorner milkvetch occurs in unstable, wind-blown sandy soils such as dunes and open, deep, sandy soils typically stabilized by vegetation and/or a gravel veneer with creosote (NNHP 2001; Barneby 1964). It is found on loose, fine-textured aeolian and fluvial sands re-deposited from the Muddy Creek Formation sedimentary deposit found in the region (NPS 2010).

All threecorner milkvetch in California Wash were found in Creosote-White Burrobush Shrubland Alliance in sand or sandy loam soils. Dominant shrubs were creosote (*Larrea tridentata*) and white burrobush (*Ambrosia dumosa*). Notes on the substrates where plants

¹ Pers. communication, Hermi Hiatt, April 17, 2019.

occurred, when taken, described them as occurring in sandy washlets, fine sand in washlets, fine sand, fine sands with scattered gravels, deep fine sand, deep fine sand with scattered gravels, sandy fine soil, and sandy fine soil with scattered gravels.

A population at Ebony Cave in Lake Mead National Recreation Area was found on prominent stabilized dunes and/or sandy inclusions on hillsides, an east-facing slope, and on adjacent lower, flat areas. Vegetation was sparsely scattered creosote-white burrobush scrub with devil's lantern (*Oenothera deltoides*), Saharan mustard (*Brassica tournefortii*), and Mediterranean grass (*Schismus barbatus*).

Elevational range so far recorded range from 1,100-2,400 feet (335-732 meters) (ibid.).



Figure 5. Habitat of threecorner milkvetch in California Wash, Clark County, Nevada. This is the site of the proposed Gemini Solar Project. Vegetation consists of creosote (*Larrea tridentata*), bursage (*Ambrosia dumosa*), and big galleta grass (*Hilaria rigida*) in a sandy substrate.



Figure 6. Habitat of threecorner milkvetch in California Wash, Clark County, Nevada. This is the site of the proposed Gemini Solar Project. Catclaw acacia (*Senegalia greggii*)

POPULATION STATUS

Threecorner milkvetch is listed by the State of Nevada as Critically Endangered/Fully Protected, by the BLM as Sensitive, by the Nevada Natural Heritage Project as At-Risk, and by the Nevada Native Plant Society (NNPS) as Threatened.

In 2001, a total population of 4,094 individuals at 39 sites were known in Nevada (NNHP 2001); however, after record rainfall in 2008, an estimated 8,000 plants were documented on Sandy Cove in the Lake Mead National Recreation Area (LMNRA) (NPS 2010). This has been to date the largest population found, although little survey work has been undertaken recently, or historically across the taxon's range. The total range of this taxon equates to only one hectare in extent.²

Large fluctuations in population sizes from year to year are to be expected in annual species such as threecorner milkvetch and are usually attributed to rainfall. Although threecorner milkvetch was known from populations in the vicinity of study areas, the status of these populations was either unknown or known to contain few or no individuals when the National Park Service evaluated them for monitoring in 2007 (NPS 2010).

During a special-status plant inventory survey by the National Park Service, 1,429 individuals within 616 occurrences of threecorner milkvetch were identified in the California Wash Study Area. Threecorner milkvetch was found in areas C, D, E, F, and in the buffer zone during this survey. The highest number of occurrences and highest population numbers were found in Area F with 504 occurrences and a population of 1,102.

The SEINet Portal Network maps five occurrences of threecorner milkvetch in the Dry Lake Valley, including one collection from Barneby (1983) that is erroneously mapped in the Spring Mountains (SEINet 2018).

On March 21, 2018, R. Kokx and O. Singh visited a known population of threecorner milkvetch (SEINet/New York Botanical Gardens collection Occurrence ID [GUID]: 94444f33-c84a-42cf-8fc8-90ab1b15a6f1) located at an unnamed cove 0.6 mile south of Ebony Cove on the west side of Overton Arm in the Lake Mead National Recreation Area (LMNRA) at 1,230-1,385 feet in elevation (SEINet 2018). Kokx and Singh found 40-50 plants with emerging compound leaflets readily identifiable as *Astragalus*. The combination of the location, appressed hairs, and associates indicated a high likelihood that the plants found were threecorner milkvetch.

During spring 2018 botanical surveys for the proposed Gemini Solar Project, gen-tie areas, and a buffer zone in Clark County, Nevada, on California Wash, Phoenix Biological Consulting crews found 1,429 individuals of threecorner milkvetch, in 616 occurrences, on 10,463 acres surveyed with transects (Phoenix Biological Consulting 2018).

THREATS

² http://heritage.nv.gov/taxon_detail/16691

This taxon is threatened by invasive weeds, urban development and sprawl, OHV use, recreational use, increased fire frequency and intensity, energy development, surface water development, utility corridor maintenance and construction, livestock grazing, soil disturbance, and the inundation and fluctuating shoreline of Lake Mead (NPS 2010). Fragmentation of populations is a historic and ongoing threat—Interstate 15 bisects the range of this taxon and isolates certain populations (see Figure 4.). This could impact pollination and gene flow.

Habitat development could change air flow patterns, thus disturbing aeolian sand deposits which are crucial habitat components for this taxon.

Threecorner milkvetch is a covered species under the Clark County Multiple Species Habitat Conservation Plan, where numerous threats are listed to plant species of the Mojave Desert Scrub Ecosystem. One of our primary reasons for emergency listing this species is that Clark County has done nothing to protect areas of Mojave Desert Scrub with rare plants from utility-scale solar energy projects in this part of the county on public lands, and a proliferation of solar development has happened without avoidance or mitigation to rare plants. In addition, trespass cattle on the closed California Wash Allotment and other closed and open allotments in the area continue unabated, as the Bureau of Land Management refuses to halt cattle freely roaming this part of Nevada, such as from the Bundy Ranch.

1. Energy development

The Gemini Solar Project is proposed on land in Clark County, Nevada, managed by the Bureau of Land Management (BLM). It would be a 690-megawatt utility-scale photovoltaic project on Mojave Desert scrub that is excellent and little disturbed habitat. The solar field, associated access roads, gen-tie lines, and a single pole site would permanently disturb 7,123 acres of high-quality desert. The area would be subject during construction to heavy equipment trampling and disturbing soils and desert surfaces here, with bulldozers, scraper-graders, trucks, and other heavy machinery. Unknown dust palliatives may be used for dust control. Water wells may be drilled, or water trucked in from outside. During operation of the power plant, regular truck traffic would drive over this area for panel washing, maintenance activities, potential mowing of vegetation and possible herbicide applications. If the Gemini Solar Project is approved, the developer would clear most of the vegetation from the site and mow the vegetation on a smaller percentage of the site. This will destroy the habitat and directly kill individual threecorner milkvetch plants.

Typical Power Purchase Agreements (PPAs) last 30 years, with decommissioning plans, but PPAs are subject to renewal or being sold and renegotiated. Decommissioning activities and mitigation measures such as seed collection or rare plants for future replanting are not well tested. Since the beginning of the push for large-scale solar development on public lands in California, Nevada, and Arizona, no utility-scale project has yet to be decommissioned and the restoration and recovery of Mojave Desert plant communities tracked and monitored. This is an unknown factor in solar development on native plant communities of the Southwest Deserts of the U.S.

Dry Lake Valley in Clark County NV has been partially converted into a 15,649-acre Solar Energy Zone (SEZ) under the Solar Programmatic Energy Environmental Impact Statement Record of Decision on land managed by the BLM.³ Subsequent to this, three utility-scale photovoltaic projects have been constructed in the Dry Lake SEZ, resulting in grading and complete removal of 3,083 acres of Mojave Desert scrub.⁴

Signed into law on April 22, 2019 by Governor Sisolak, Nevada Senate Bill 358 increases Nevada's Renewable Portfolio Standard (RPS) to 50% by 2030. This could lead to a large build-out of utility-scale solar projects in Clark and Lincoln Counties on public lands desert ecosystems, such as on Mojave Desert sand habitat managed by the Bureau of Land Management. This would lead to large cumulative impacts.

2. Utility transmission construction and maintenance

The proposed West-wide Energy Corridor designation is undergoing review and planning. Section 39-116 is a Designated Section 368 Energy Corridor⁵ that passes through the area west of Valley of Fire State Park, along I-15, and potentially on top of milkvetch populations. Future construction of large high-voltage transmission towers in this corridor would disturb soils and possibly allow more spread of invasive plants. New roads would be created for maintenance activities, potentially increasing OHV and recreational use and soil disturbance.

Section 368 of the Energy Policy Act of 2005 (the Act), Public Law 109-58 (H.R. 6), enacted August 8, 2005, directed the Secretaries of Agriculture, Commerce, Defense, Energy, and the Interior to designate under their respective authorities corridors on federal land in 11 Western States (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors).

The Bureau of Land Management (BLM), U.S. Department of Energy (DOE), U.S. Forest Service (USFS), U.S. Department of Defense (DoD), and the U.S. Fish and Wildlife Service (USFWS) issued a Draft Programmatic Environmental Impact Statement (PEIS) on November 16, 2007 and a Final PEIS on November 20, 2008 that evaluated issues associated with the designation of energy corridors on federal lands in eleven Western states. The PEIS identified potential corridors, such as those in southern Nevada.

Based upon the information and analyses developed in the PEIS, the Secretaries of the Interior and Agriculture signed Records of Decision (RODs) in 2009 designating Section 368 energy corridors by amending land and resource management plans on lands administered by their respective agencies in the eleven Western states.

³ <http://solareis.anl.gov/sez/drylake/index.cfm>

⁴ <https://www.doi.gov/pressreleases/interior-department-approves-first-solar-energy-zone-projects>

⁵ <http://corridoreis.anl.gov/regional-reviews/region-1/>

The designation of energy transport corridors in land and resource management plans identified the preferred locations for development of energy transport projects on lands administered by the USFS and BLM. These locations were selected to promote renewable energy development in the West, improve reliability, relieve congestion, and enhance the capability of the national grid to deliver electricity. But several corridors are of high concern and subject to litigation⁶.

This review is intended to expedite the permitting process; provide coordinated, consistent interagency management procedures for permitting rights of way (ROWs) within the corridors; and identify mandatory requirements for future projects.

The evaluation of future project-related environmental impacts will await site-specific proposals and the required site-specific environmental review. A quantifiable and accurate evaluation of impacts at the local project level can be made only in response to an actual proposed energy project, when a proposal for an action with specific environmental consequences exists. Future proposed transmission lines within the 39-116 section may have significant impacts on threesquare milkvetch.

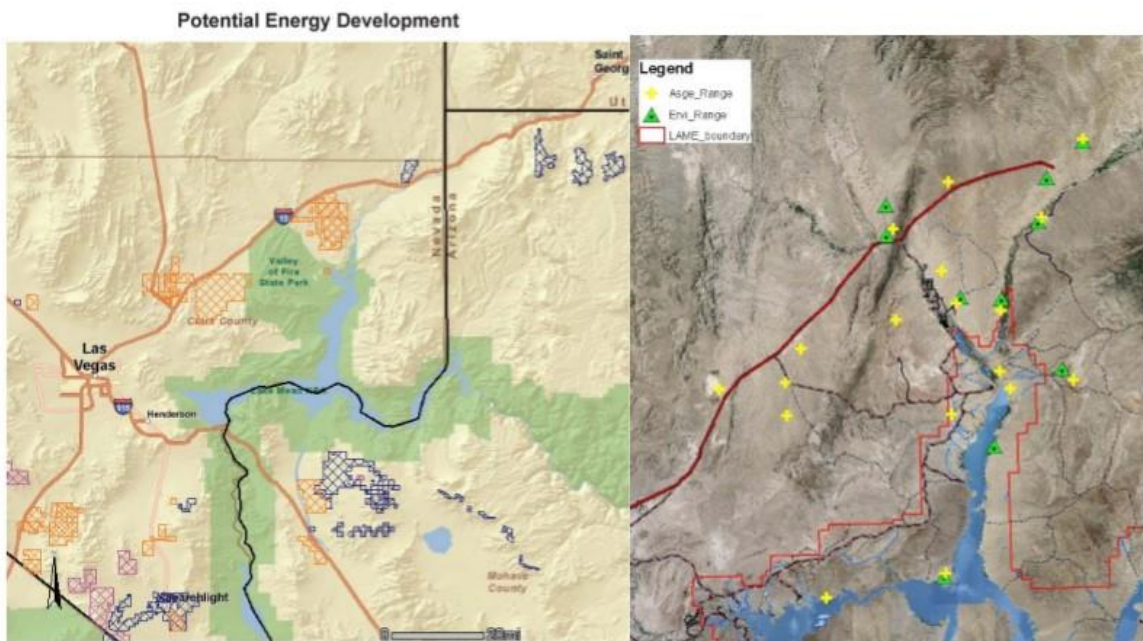


Figure 41. Threats of energy development on rare sand species. **A)** Map showing proposed areas for energy development in Clark County; **B)** map showing threesquare milkvetch and sticky buckwheat distributions.

Figure 7. Solar Energy Zones and proposed solar projects in southern Nevada and adjacent Arizona. (Clark County Multiple Species Habitat Conservation Plan)

⁶ *ibid.*



Figure 8. Gemini Solar Project with locations of *Astragalus geyeri* var. *triquetrus* within the proposed footprint of the energy development. (Phoenix Biological Consulting 2018)

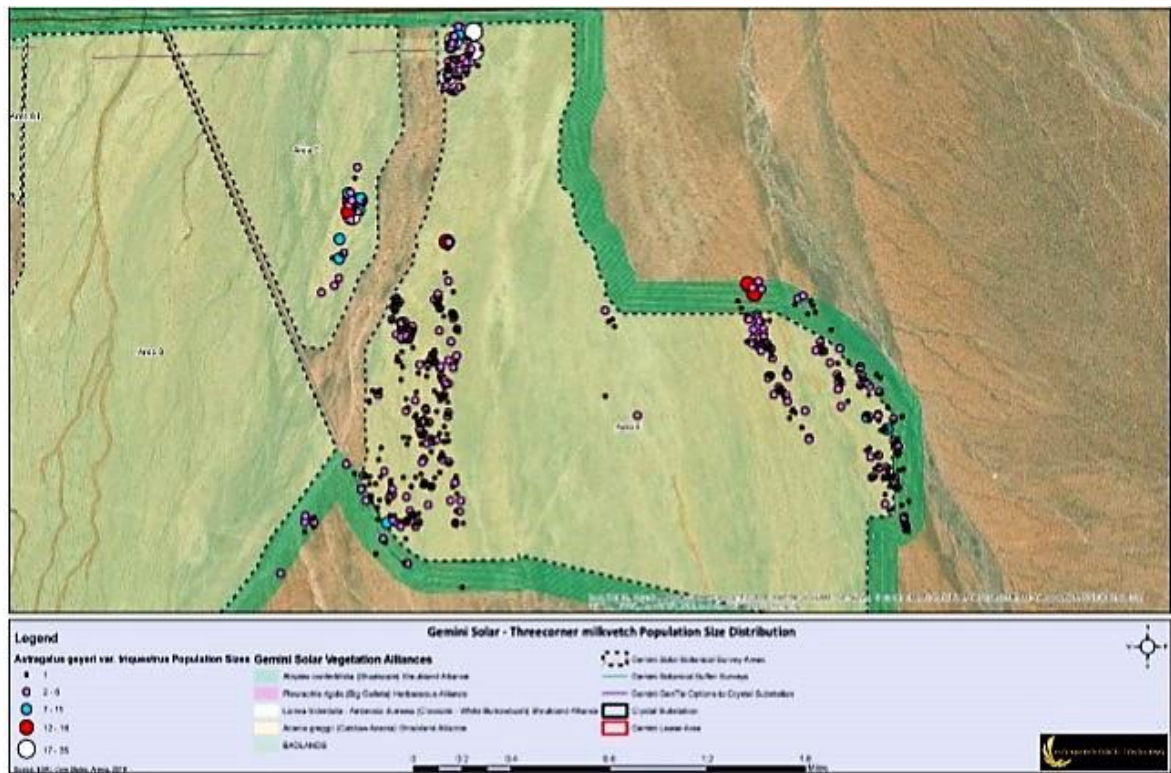


Figure 9. Portion of the proposed Gemini Solar Project with locations of *Astragalus geyeri* var. *triquetrus* within the footprint of the energy development. (Phoenix Biological Consulting 2018)

3. Weedy plant invasions

Because of its habitat preferences, this taxon occurs in areas that may be invaded by sand-loving weed species such as Saharan mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* spp.), salt cedar (*Tamarix ramosissima*), and Russian thistle (*Salsola tragus*). Saharan mustard is listed by the Nevada Department of Agriculture (NDA) on the *Nevada Noxious Weed List* as a Category B Weed, which are noxious weeds that are generally established in scattered populations in some counties of the State (NDA 2018a).

Saharan mustard, African mustard (*Strigosella [Malcolmia] africana*), Mediterranean grass, Russian thistle, and Halogeton (*Halogeton glomeratus*) were found in California Wash during spring 2018 botanical surveys by Phoenix Biological Consulting.

Red brome (*Bromus madritensis* ssp. *rubens*), cheatgrass (*Bromus tectorum*), Mediterranean grass (*Schismus* sp.), and red stem stork's bill (*Erodium cicutarium*) were found to be widespread in California Wash during botanical surveys in spring 2018 (Phoenix Biological Consulting 2018). The threat from the increase in fire frequency due to invasive non-native grasses such as cheatgrass and red brome was found to be significant for the Endangered Shivwits milkvetch (USDI-FWS, 2006a).

Several other invasive weed species were recorded in California Wash by Phoenix Biological Consulting in spring 2018 during the botanical surveys including: Russian knapweed (*Acroptilon repens*), oat grass (*Avena* sp.), Chilean chess (*Bromus berterioanus*), ripgut brome (*Bromus diandrus*), Malta starthistle (*Centaurea melitensis*), Bermuda grass (*Cynodon dactylon*), foxtail barley (*Hordeum murinum* ssp. *glaucum*), Timothy grass (*Phleum pratense*), prickly sow thistle (*Sonchus asper*), and salt cedar (*Tamarix ramosissima*). Of these, Malta starthistle is a Category A Weed, defined as noxious weeds that are “generally not found or that are limited in distribution throughout the State;” Russian knapweed is a Category B Weed (defined above); and, salt cedar is a Category C Weeds, defined as noxious weeds that are generally established and generally widespread in many counties of the State (NDA 2018a).

Field botanists have noticed vast increases in Sahara mustard populations in the last 10 years.⁷

⁷ Pers. communication, Hermi Hiatt, April 17, 2019.

4. Livestock grazing

California Valley and Bunkerville Allotments are closed grazing allotments under the Clark County Multiple Species Habitat Conservation Plan in order to protect Federally Threatened desert tortoise⁸, but trespass cattle from the Bundy Ranch have been reported across this area.⁹ Bunkerville is in the midst of the range of the taxon, and an unknown number and distribution of trespass cattle roam the habitat of this forb. The Mormon Mesa and Gold Butte areas also contain trespass cattle at times.

Cattle grazing and trampling can significantly impact native annual forbs. About half of the *Astragalus* species contain neurotoxins, which are toxic to livestock.¹⁰ Yet other species of milkvetch are highly palatable to domestic livestock.

Harper (1997) reported that the two western occurrences of Shivwits milkvetch were grazed in their entirety by cows. Consequently, this may be the cause of potential population declines detected since 1996 at Shivwits milkvetch sites. There are no parallel studies of cattle impacts on threecorner milkvetch, and therefore this is a potentially large threat.

5. OHV use

Illegal off-road use can disturb soils and crush vegetation in the deserts.

The habitat has major off-highway vehicle routes going through it. Off Highway Vehicle (OHV) activity can directly crush individual plants. OHV activity can compact soils and threecorner milkvetch requires a loose, sandy substrate. OHV activity can also encourage the encroachment of invasive weeds such as Russian thistle (*Salsola* spp.) on the milkvetch habitat.

While most of the OHV activity is legal, increased human population and local development can encourage some illegal activity and OHV trespass.

Fugitive dust from OHV activity could impact growth rates of desert plants. Fugitive dust often slows down agricultural production and should be considered as a potential impact for the threecorner milkvetch.

6. Urban development

Clark County, Nevada, adopted a resolution that would ask Federal lawmakers to turn over 38,000 acres of federal lands managed by the Bureau of Land Management to private ownership. Some of this proposed land transfer occurs on the southwest margin of

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https://web.archive.org/web/20140413144331/http://www.blm.gov/pgdata/etc/medialib/blm/nv/field_offices/las_veg_as_field_office/cattle_trespass.Par.49759.File.dat/Gold%20Butte%20Cattle%20Trespass%20EA%20DOI-BLM-NVS010-2014-0020-EA%20%282%29.pdf

⁹ https://www.biologicaldiversity.org/news/press_releases/2018/livestock-grazing-01-10-2018.php

¹⁰ https://public.govdelivery.com/accounts/USDAARS/subscriber/subscription_success

the habitat for threecorner milkvetch. The land transfer would also bring development and urban sprawl to the border of the habitat for the species. New subdivisions and land clearing would spread of invasive weeds. Placing a new, large population of new residences on the margin of the habitat will encourage more use of adjacent public lands. That could encourage trampling of habitat, increased off-highway vehicle use and the spread of invasive weeds onto the habitat. The resolution is supported by the county and is now being considered by the Nevada Legislature and Federal Lawmakers.

The resolution can be viewed

here: <http://www.clarkcountynv.gov/airquality/announcements/Pages/Clark-County-Lands-Proposal.aspx>

The recently proposed Clark County Lands Transfer Bill would potentially increase urban sprawl to the border of Lake Mead National Recreation Area at Boulder Basin. Records of threecorner milkvetch have been found in Boulder Basin at Sandy Cove within the National Recreation Area.

The Southern Nevada Resource Management Plan (RMP) revision under development for years by BLM Las Vegas Field Office was halted and scrapped recently. This would have provided the public an opportunity to comment on rare plants and increasing threats to rare taxa. But because the RMP revision was halted, this update for conservation of public lands in Clark County, Nevada, is no longer available. Therefore, management of rare plant species such as threecorner milkvetch are not prioritized despite increased threats.

Federal laws call for any proposed expanded development surrounding Las Vegas to undergo a rigorous environmental review from the U.S. Fish and Wildlife Service and BLM. The review would evaluate potential harm to sensitive and listed species, and require public input and disclosure of those harms. The county instead wants to cut the U.S. Fish and Wildlife Service out of the equation, specifying its own inadequate measures to allegedly make up for the habitat destruction.¹¹

7. Increased recreation and visitor use to park units

Urban growth in Las Vegas and cities in Arizona could lead to increased visitor use of park units like Valley of Fire State Park and Lake Mead National Recreation Area. Illegal incursions of vehicles, trampling, tracking in invasive weeds, hiking and camping could increase in parks, with impacts to native forbs.

The habitat lies in close proximity to the Las Vegas Valley which now has a population of over 2 million people.¹²

¹¹ https://www.biologicaldiversity.org/news/press_releases/2018/desert-tortoise-06-18-2018.php

¹² <http://worldpopulationreview.com/us-cities/las-vegas-population/>

The demand for recreation has grown with the population of the Las Vegas Valley.

8. Drought

Periods of drought can be an added stressor to populations that are already under disturbance regimes such as urban development, solar energy construction, livestock grazing, and illegal off-road activity which disturb or remove soil surfaces.

Fluctuations of the shoreline of Lake Mead, from drought and urban water use, can submerge populations.

Climate change may exacerbate drought cycles and cause more extreme aridity in the Mojave Desert.

9. Fragmentation of habitat and blockage or disruption of aeolian sand-transport corridors are another threat. Energy sprawl and urbanization pose a threat to aeolian soils, which are critically important for the habitat. Major projects near the habitat could alter wind-blown sands directions thus affecting the species.

Linkages for dispersal between populations need long-term protection. Species with low mobility or plants, termed corridor dwellers, must maintain sustainable populations within sand corridors. Barrows et al. (2011) modeled niche space on a landscape level for small sand-dwelling species (in this case a pocket mouse), and these conservation values can apply well to sand-obligate plant species.

Large-scale developments threaten to fragment the sand corridors in the Clark County area of the range of threecorner milkvetch, such as the 7,000-acre proposed Gemini Solar Project. Chain-link fences are built around utility-scale solar projects, and these could catch wind-blown sand and hinder sand transport, even choking off sand needed for populations of milkvetch in downwind areas.

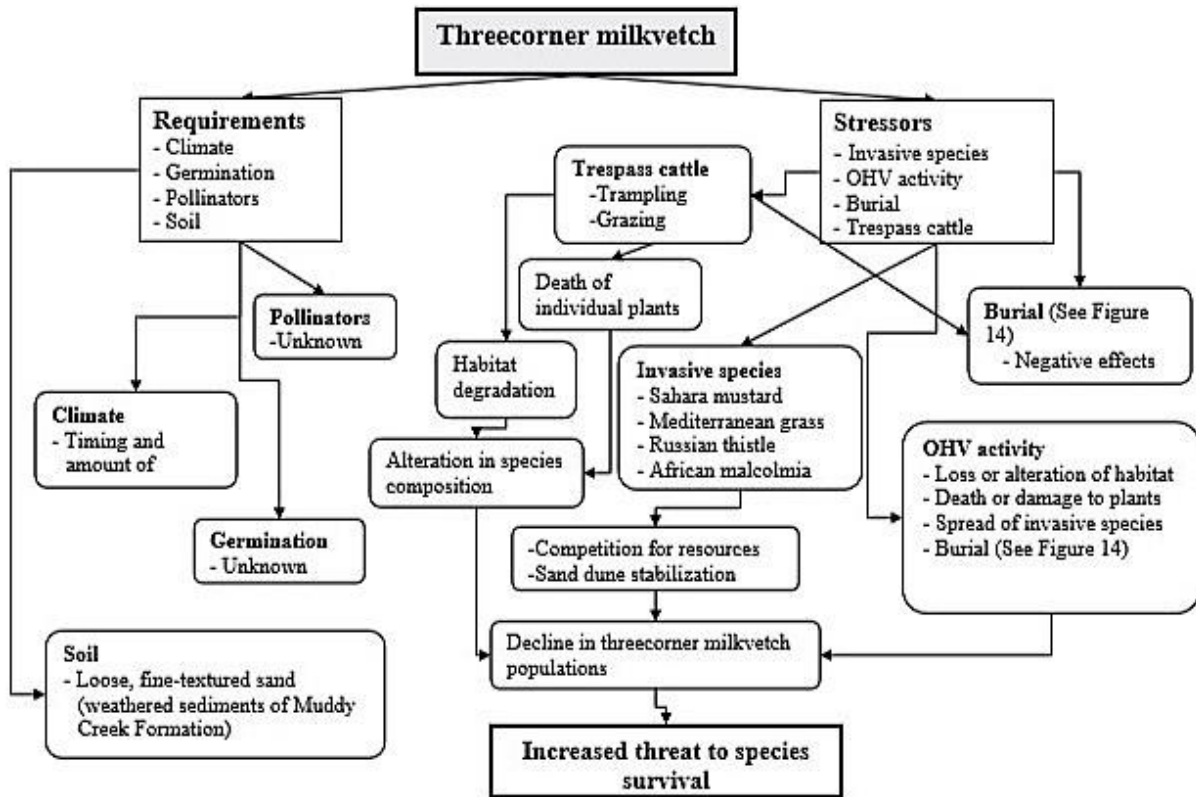


Figure 12. Conceptual model illustrating requirements and the effects of stressors on threecorner milkvetch.

Figure 10. Flow chart from the Clark County Multiple Species Habitat Conservation Plan showing habitat requirements and stressors to threecorner milkvetch. (Clark County Multiple Species Habitat Conservation Plan)

Conclusion

Because of the eminent threat of large areas of habitat loss due to energy development, looming threats of public lands transfer and privatization, in addition to cumulative and increasing threats of invasive plants, off-road activity, recreational usage, illegal livestock trampling, and climate change, we request an emergency listing review of threecorner milkvetch.

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