BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO PROTECT THE RED ROCK SUNFLOWER (*Helianthus devernii*) UNDER THE ENDANGERED SPECIES ACT AND TO CONCURRENTLY DESIGNATE CRITICAL HABITAT

Credit: James Bailey 2023/iNaturalist

CENTER FOR BIOLOGICAL DIVERSITY

10 February 2026

NOTICE OF PETITION

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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 ("APA"), 5 U.S.C. § 553(2); and 50 C.F.R. § 424.14(a), the Center for Biological Diversity hereby petitions the Secretary of the Interior, through the United States Fish and Wildlife Service ("FWS" or "Service"), to protect the Red Rock sunflower (*Helianthus devernii*) as a threatened or endangered species under the ESA.

FWS 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). FWS must make this initial finding "[t]o the maximum extent practicable, within 90 days after receiving the petition." *Id.* If FWS makes a positive initial finding, it must then determine within 12 months after receiving the petition whether the petitioned action is warranted, and if so, the Secretary shall "promptly" propose to implement the listing action with a general notice. 16 U.S.C. § 1533(b)(3)(B). Finally, the Secretary shall finalize the regulation to implement their listing determination "within the one-year period beginning on the date on which general notice is published." 16 U.S.C. § 1533(b)(6)(A). The petitioner also requests that critical habitat be designated for the Red Rock sunflower concurrently with the species being listed, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12. References cited in this petition will be available at the following link: https://diversity.box.com/s/8irgkl1lvia90ilg7sgxcrv371mxztmp.

The Center for Biological Diversity ("Center") is a nonprofit, public interest environmental organization dedicated to the protection of imperiled species and the habitat and climate they need to survive through science, policy, law, and creative media. The Center is supported by more than 1.7 million members and supporters across the country. The Center works to secure a future for all species, great and small, hovering on the brink of extinction. The Center submits this petition on its own behalf and on behalf of its members and staff with an interest in protecting the Red Rock sunflower and its habitat.

Submitted this 10 February 2026.

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TABLE OF CONTENTS

Executive summary 5
Introduction 6
Biology 8
I. Taxonomy 8
II. Description 9
III. Habitat 12
Distribution 13
Population status 14
Threats 16
(A) Present or threatened destruction, modification, or curtailment of habitat 17
(D) Inadequacy of existing regulatory mechanisms 23
(E) Other natural or manmade factors affecting survival 26
Request for critical habitat designation 30
Conclusion 31
Literature cited 32

EXECUTIVE SUMMARY

Red Rock sunflower (*Helianthus devernii*) is an endemic wildflower known only from alkaline desert springs in Red Rock Canyon National Conservation Area (RRCNCA) west of Las Vegas, Nevada. There are believed to be fewer than 1,000 plants in total, with most divided between two neighboring populations and fewer than 10 plants at a third site. Extensive surveys have failed to locate any additional populations, and all three sites are close enough together that a single catastrophic event could wipe out the entire species.

This imperiled desert spring endemic, recognizable by its charmingly lopsided yellow flowers, is confined to Calico Basin, one of the busiest and most heavily degraded areas of RRCNCA. Its numbers are divided between BLM-managed NCA lands and adjacent private inholdings. Unfortunately, local BLM resources at present are insufficient to manage high visitor traffic and the habitat degradation that comes with it. Red Rock sunflower is presently threatened by numerous "social" (unofficial, inefficient, and heavily redundant) hiking trails, evidence of off-trail horseback riding activity, and a suite of invasive and non-native plant species which have been introduced by the wide variety of local and tourist visitors. This flower also appears to be unable to reproduce at present—perhaps as a result of soil trampling or inbreeding depression from small populations.

In addition to these direct impacts to Red Rock sunflower, anthropogenic climate change and natural patterns have combined to create a megadrought in the Mojave Desert which has been ongoing for nearly three decades and represents the most severe drought in the region for the past 1,200 years. These conditions, in addition to creating drier soils and greater fluctuations in the water table, are leading to a scarcity of surface water which in turn increases anthropogenic demand for groundwater. Red Rock sunflower is a groundwater-dependent species with a perilously small habitat. Loss of adequate soil moisture due to over-pumping of groundwater by surrounding communities would almost certainly eliminate its habitat altogether. As drought and invasive species both proliferate in the Mojave, wildfire also becomes a greater threat. Due to Red Rock sunflower's small range, one wildfire would be enough to sweep through all three populations and eliminate the species altogether. The species may also be at risk due to habitat damage from feral burros and horses which occupy RRCNCA and rely upon riparian and spring areas as the only available water source. Herds of wild herbivores in the desert are capable of destroying great swaths of vegetation through grazing, trampling, and loafing behaviors.

Red Rock sunflower is significantly threatened across its entire range, and the lack of reproduction occurring in wild populations right now suggests that the entire species may be at risk of imminent collapse without greater protections. This flower must be protected under the Endangered Species Act, and critical habitat must be designated to safeguard the desert springs upon which this endemic species relies.

INTRODUCTION

The Las Vegas metropolitan area is one of the fastest-growing population centers in the country. In the decade spanning 2000–2010, it underwent a 41.8% increase in population, the third highest in the country during that time,[1] and from 2023–2024, Clark County as a whole experienced the fifth-highest population increase in the nation, with over 44,000 new residents (US Census Bureau 2025). Las Vegas remains an incredibly popular destination for tourists as well, with the Las Vegas Convention and Visitors Authority reporting 41.6 million tourists in 2024 (LVCVA 2025). The city is emblematic of one of the greatest ecological and economic concerns in the western US: as human populations grow, easily sprawling out into the broad, flat expanse of the desert, where will they get their water?

Even in its earliest days, Las Vegas was groundwater-dependent, and unregulated pumping of artisanal wells led to multiple desert springs drying out by the 1950s (Pavelko et al. 1999, 52–54). Today, the city and surrounding area receives much of its water from the drought-blighted Colorado River, but there still exist a massive number of claims on the area's local groundwater. Current water rights claims would allow for 350% of the aquifer's annual rechargeable yield to be pumped, and in recent years as much as 280% of annual yield has been extracted (NDWR 2023, pp 7, 9). This represents a huge threat to all desert life, but is a particular concern for groundwater-dependent desert plants which may already be experiencing a shift in habitat suitability (Corlett and Westcott 2013, 482; Patten et al. 2007, 7–8) as anthropogenic climate change continues to intensify the region's ongoing megadrought (Williams et al. 2022).

Las Vegas is located within the Mojave Desert, a transitional desert which links the arid regions of the Great Basin to the north and the Sonoran Desert to the south. Despite being the smallest of the North American deserts, the Mojave hosts more than 3,000 native plant species, a quarter of which are endemic (Walker and Landau 2018, 3). Fourteen endemic plant species are known to occur only in the Spring Mountains, which make up the western edge of the Las Vegas Valley and are partially within the BLM-managed Red Rock Canyon National Conservation Area (RRCNCA) (Draper and Esque 2021, 54).

In recent decades, there has been increasing tourism pressure on RRCNCA, an area known for its natural beauty, abundant recreational opportunities, and ease of access from Las Vegas. The number of visitors to the NCA—3.6 million in 2023—places severe stress on both the fragile desert ecosystems and the limited federal and private employees who are tasked with managing the lands and the tourists. RRCNCA's rising popularity has led to extensive off-trail trampling, unauthorized climbing and horseback riding activity, and a considerable number of invasive plant introductions (USDOT 2012, 1; Poff 2024, 3; BLM unpublished reports #1, #2; Travers

[1] U.S. Geological Service Earth Resources Observation and Science (EROS) Center. "Las Vegas, Nevada, USA." https://eros.usgs.gov/earthshots/las-vegas-nevada-usa. Accessed 9 September 2025.

2021, 22). The NCA's fragile and rare riparian ecosystems are particularly vulnerable to degradation (Travers 2021, 19).

Red Rock sunflower (*Helianthus devernii*) is a perennial flower which was collected in 2007 and formally described in 2021 (Draper and Esque 2021). There are no more than 1,000 plants in total, all of which are confined to a few alkaline desert springs within Calico Basin, one of the most popular—and degraded—areas of RRCNCA. The high number of visitors has led to the creation of numerous unofficial hiking and horseback riding trails which cut through the Red Rock sunflower's limited habitat, creating areas of soil compaction and providing a vector for invasive plant species. Drought, caused by anthropogenic climate change and regional climatic patterns, can interact with certain prolific invasives such as bromes (*Bromus* spp.) to increase the frequency and severity of wildfires in the region as well. Most often, wildfires here are sparked by human activity, such as illegal target shooting or campfires—another indicator that current resources and staffing levels in RRCNCA are insufficient.

Although the Red Rock sunflower was listed in 2024 as a Critically Endangered native plant species by the Nevada Division of Forestry (NDF), these protections are insufficient to protect the species from the threats it faces. The BLM needs additional resources to create fencing around Red Rock sunflower populations and ensure that this fragile habitat can be protected from both legal and illegal visitor uses within RRCNCA. Listing this endemic, imperiled plant under the Endangered Species Act, and designating critical habitat, will provide the increased protections and funding which are so gravely needed to ensure the species' survival.

BIOLOGY

I. TAXONOMY

Species: *Helianthus devernii* T. M. Draper
Red Rock sunflower

The Red Rock sunflower (*Helianthus devernii*) is somewhat new to science. The first specimen was collected 'serendipitously' on a survey in 2007, and it was published as a new species by Draper and Esque (2021) after molecular analysis and review of morphology by multiple experts revealed that it did not match known species (p 52). Within *Helianthus*, this species belongs to section *Ciliares* series *Pumili*, and its closest relative is *H. pumilis* (*Id.*). Although it is referred to as the Calico Basin sunflower in the Nevada BLM's 2023 Special Status Species List,[2] it is otherwise almost unanimously called the Red Rock sunflower. Therefore, this common name—which is also the one suggested by Draper and Esque—is the name we will use here.

Credit: User Botanybae 2022/iNaturalist.

[2] https://www.blm.gov/sites/default/files/docs/2023-11/NV-IM-2024-003%20att%201%20BLM%20Nevada%20Special%20Status%20Species%20List_0.pdf. Accessed 10 September 2025.

II. Description

Figure 1. Top left: habit of Red Rock sunflower (Draper and Esque 2021), top right: dead stems in February (credit: Corey J. Lange 2022/iNaturalist), bottom row: flower head (credit both: Matt Berger 2022/iNaturalist).

The Red Rock sunflower is a perennial, herbaceous member of the Asteraceae family. It has a tufted growth habit, with many stems branching from a woody caudex, and can look almost like a clump of grass when not in flower. Its stems reach a height of approximately one meter, with thin leaves growing in opposite arrangement near the bottom and alternating arrangement higher up. The leaves typically have a single latitudinal vein and smooth margins, with both leaf faces sporting multicellular, gland-dotted hairs (Draper and Esque 2021, 52–53).

Figure 2. Left: Leaf shape of Red Rock sunflower; Right: Leaf arrangement on lower stems (from Draper and Esque 2021).

Like many members of the aster family, the singular 'flower' is actually a compound head comprised of an arrangement of disk and ray florets. Each stem terminates in one head with 12–18 yellow-orange disk florets and 5–8 yellow ray florets (Draper and Esque 2021, 52–53). The sparse, irregular arrangement of ray florets sometimes gives the impression that the flower heads are missing some of their petals (Fig. 1). This perennial flower begins its annual growth from the basal caudex in March and blooms in June–September, but previous years' growth is often present as dead gray or white stalks dispersed through the living plant matter or remaining after the end of the growing season (*Id*; Fig. 1).

The technical description from Draper and Esque (2021) is as follows: "Perennial, tufted, herbaceous from a branched woody caudex, above ground portions dying back each year. Stems many, up to 1.02 m tall, glabrous, glaucous, previous year's stems usually present, turning bony white. Leaves cauline, sessile, one nerved (some lowermost weakly three veined), margins entire; proximal leaves opposite, lowermost usually deciduous at time of anthesis 40.6–56.3 mm long 3 4.4–9.0 mm wide; middle stem leaves largest 68.0–102.8 mm long 3 2.8–7.6(10.3) mm wide, linear-narrowly elliptic; distal leaves reduced upwards, alternate, linear 25.7–50.7(64.4) mm long 3 1.2–1.7 mm wide; abaxial and adaxial surfaces with multicellular strigose hairs and scattered spreading multicellular hairs, gland-dotted usually more so on abaxial side. Heads usually one per stem or stems, sometimes branched with one head terminating the branch. Involucres cylindric, 6.3–10.2 mm tall 3 5.66.3 mm wide. Phyllaries (2)3 series with multicellular, antrorse, hispidulous hairs, gland-dotted, apices acute, sometimes with a mucronate tip, 15–18 in number, ovate to lanceolate; outer 4.1–5.4 mm tall 3 2.0–2.5(3.5) mm wide; middle (6.1)6.9–7.2 mm tall 3 (2.2)2.8–3.5 mm wide; inner (4.7)5.9–7.3 mm tall 3 1.6–2.7 mm wide. Paleae 7.8–8.5 mm, hispidulous distally, gland dotted, entire to rarely weakly three toothed-erose apically.

Credit: Matt Berger 2022/iNaturalist.

"Ray florets 5–8, laminae yellow, (7.3)9.0–10.7 mm long 3 3.8–5.0 mm wide, three toothed, abaxial side hispidulous, gland-dotted, sometimes with vestigial styles, adaxial side glabrous; sterile ovary as wide as ray tube, and smaller than fertile disk ovary. Disk florets 12–18(28), yellow; throat (4.5)4.7–6.2 mm long with multicellular hispidulous antrorse hairs, sometimes glandular especially proximally; tube abruptly constricted, 1.2–1.6 mm long, more or less glabrous. Anthers yellow when fresh, quickly turning brownish upon drying, with a few scattered, spreading hairs; appendages mostly yellow sometimes with some brown; stigmas hispidulous. Cypselae quadrangular, 3.5–4.0 mm long, tan with scattered brown specks, proximal end beset with tomentose hairs, soon deciduous, distal end with straight, ca 1.2 mm, erect/antrorse hirsute hairs; pappus of 2–3 deciduous awns/scales (lacerate/erose) sometimes with 1–4 shorter awn like setae." (Draper and Esque 2021, pp 52–53).

Pollinators are not reported, though Patrick Donnelly with the Center for Biological Diversity observed an instance of pollination by an orange sulphur (*Colias eurytheme*), a widely-distributed butterfly species (P. Donnelly, pers comm 4 December 2025). Although a germination experiment with wild-collected seeds from 2023 yielded a 44% germination success rate following a 24-hour soak *ex situ*, only one young plant has ever been discovered (BLM, unpublished report #2, 2). There have not yet been any formal studies into the reproductive biology of the Red Rock sunflower, but based upon this result alone, limited reproductive success (possibly unrelated to germination success) may present a threat to this flower. Many *Helianthus* species, both annual and perennial, show near-zero rates of self-fertilization (Atlagić and Terzić 2015), so small population size may be a contributing factor.

III. HABITAT

Figure 3. Habitat for Red Rock sunflower. Credit: Jim Boone 2025/iNaturalist.

Red Rock sunflower grows in moist alkaline soils near desert springs, although it typically remains at such a distance so as to "keep its feet dry". This plant is associated with soils of red Aztec sandstone alluvium, typically with a thin saline crust on the surface (McClinton 2024; Draper and Esque 2021, 54). Other plants associated with this habitat type include velvet ash (*Fraxinus velutina*), Mojave thistle (*Cirsium mohavense*), tall dropseed (*Sporobolus compositus*), and deergrass (*Muhlenbergia rigens*), along with other species typically associated with upland habitats such as wooly bluestar (*Amsonia tomentosa*), hairy goldenaster (*Heterotheca villosa* var *scabra*), and threadleaf snakeweed (*Gutierrezia microcephala*). Between the patches of desert spring habitat where Red Rock sunflower grows, the community is dominated by the desert shrubs blackbrush (*Coleogyne ramosissima*) and white bursage (*Ambrosia dumosa*) (Draper and Esque 2021, 54). The Spring Mountains, where RRCNCA is located, are known to contain 14 endemic plant taxa, including Red Rock sunflower (*Id.*).

Red Rock sunflower grows in an area along the western edge of the Las Vegas Valley, a region noted for being hot, sunny, and dry, where daily temperatures in the summer frequently exceed 100 degrees and precipitation is scarce. The Spring Mountains block rainfall and moisture moving in from the Pacific, leading to upwards of 300 sunny days per year, though occasional storms leading to flash floods do occur (Gorelow and Stachelski 2012, 2; NWS 2025). Groundwater and desert springs are incredibly important to the maintenance of these desert ecosystems.

DISTRIBUTION

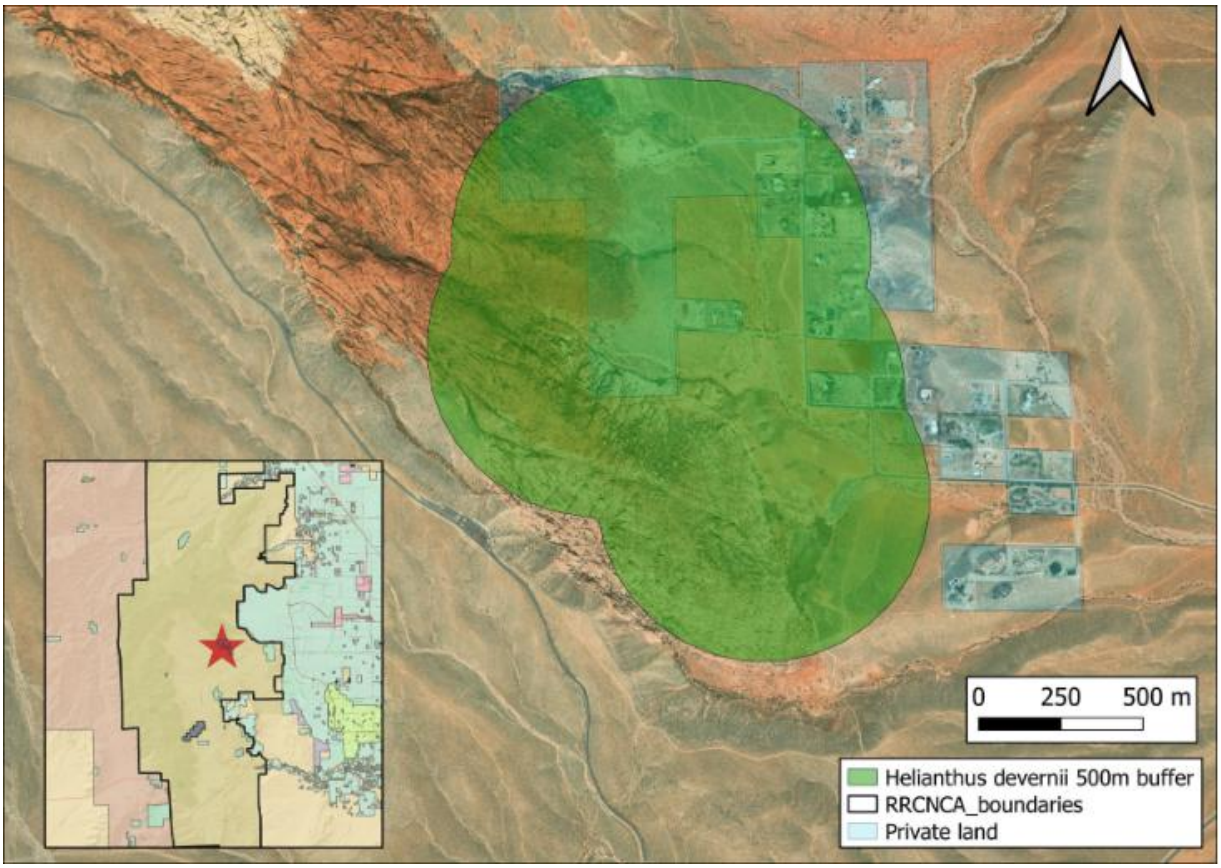

Figure 4. Geographic range of Red Rock sunflower, with green area representing the species' entire range plus a 500m buffer. Credit: McClinton 2024.

Red Rock sunflower is endemic to a small part of the Calico Basin in the Red Rock Canyon National Conservation Area (RRCNCA) in Clark County, NV, directly west of Las Vegas. It is found at only two small alkaline springs, and its geographic range of little more than 0.25 sq. km (McClinton 2024) makes this sunflower an exceptionally narrow endemic. Researchers with both the BLM and the Nevada Division of Natural Heritage feel that there are unlikely to be any more significant undiscovered populations of this plant due to the rarity of its habitat and the thorough searches which have already been conducted by both the BLM and others (E. Miskow, pers comm 21 August 2025; McClinton 2024; Draper and Esque 2021, 55).

Due to this highly imperiled sunflower being located on accessible public lands, we have elected not to include precise locations or specific spring names in this petition.

POPULATION STATUS

There are three populations of Red Rock sunflower, though they are sufficiently close to each other that a large-scale disturbance could negatively impact every plant. All are located in Red Rock Canyon National Conservation Area (RRCNCA), but only around 57% of plants are on BLM lands; the remainder are on private inholdings within RRCNCA (BLM, unpublished report #2, 2). This species is vulnerable due to its location within RRCNCA, its narrow habitat requirements, and the current lack of resources afforded for its protection. Federal action is necessary to ensure that Red Rock sunflower is protected, both from an ever-growing tourist presence and from an increasingly warm and unpredictable climate.

Table 1. All known populations of Red Rock sunflower.

Population	# plants	Year discovered
Well	463	2007
Spring	495	2007
New	5	2022

Red Rock sunflower is existentially threatened by its extremely small range and low population size. There are approximately 963 plants, with the vast majority of those divided fairly evenly between two populations ("Spring" and "Well") and only 5–7 plants located at the third population ("New") (McClinton 2024; BLM, unpublished report #1, 15). Although these population numbers are higher than those reported by Draper and Esque (2021), when population sizes were estimated to be approximately 100 plants at one spring and fewer than 300 at the other (p 55), there have not been any new populations discovered since the seven-plant "New" population, and no more are believed to exist (McClinton 2024). Two alkaline springs with similar habitat, one to the north and one to the south of the known Red Rock sunflower populations, have been searched and yielded no plants (Draper and Esque 2021, 55). Further, only one young Red Rock sunflower has been seen despite a 44% germination success rate for seeds *ex situ* (BLM, unpublished report #2, 2), suggesting that young plants may be struggling to succeed in the increasingly disturbed habitat. Many sunflower species are self-incompatible (Atlagić and Terzić 2015), so low reproductive success as a consequence of small population size may also be contributing to this apparent paucity of young plants.

The habitat quality at these two springs is deeply impacted by the heavy recreational traffic at RRCNCA. The NCA's proximity to Las Vegas, combined with its scenic beauty, draw an increasing number of visitors each year. A 2012 report by the Department of Transportation found that nearly a million people visited RRCNCA each year (p 1); in 2023, the final Management Report for the NCA reported a visitor count of 3.6 million (Poff 2023, 3). Unofficial "social trails" used by visitors track around and cut through Red Rock sunflower habitat, damaging plants and soils, while wild burros and unauthorized equestrian use in the area cause further trampling and altered hydrology (McClinton 2024). The high number of out-of-

state visitors to the NCA has also led to a great variety and volume of invasive plant introductions, which threaten available habitat and contribute to a greatly altered fire regime (Travers 2021, 22).

Although it grows near springs, Red Rock sunflower grows far enough back from the spring that it almost never floods. The rocky slopes and drainages where it grows run over or through the sandstone into subsurface layers, likely keeping the soil moist for a good amount of the year despite a lack of visible water. This has allowed the Well population to persist despite the well itself being closed for many years (BLM unpublished report #2, 2). Groundwater level decline due to over-pumping or drought could be disastrous for Red Rock sunflowers at all populations. This threat may be worsened by climate change, which is expected to intensify droughts, wildfires, and other water needs in the area.

Although the Red Rock sunflower was listed in December 2024 as a Critically Endangered native plant species by the Nevada Division of Forestry (NDF), these protections are insufficient to protect the species from the threats it faces. First and foremost, any protections will require enforcement, an issue with which RRCNCA is already struggling due to limited staff (Poff 2023, 2; Rothermel et al. 2022, 6). Further, NDF regulations focus primarily on the issuance of permits for activities which would harm listed species, and does not apply to plants on federal lands (where more than half of Red Rock sunflowers are located). Listing this endemic, imperiled plant under the Endangered Species Act will provide the increased protections and funding which are so gravely needed to ensure the species' survival.

THREATS

Under the ESA, 16 U.S.C. § 1533(a)(1), FWS is required to list Red Rock sunflower if it is in danger of extinction or likely to become endangered across all or a significant portion of its range. This species must meet at least one of the factors enumerated in section 4(a):

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;
(B) Overutilization for commercial, recreational, scientific, or educational purposes;
(C) Disease or predation;
(D) The inadequacy of existing regulatory mechanisms;
(E) Other natural or manmade factors affecting its continued existence.

16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 421.11(c)(1)-(5). The review and determination by FWS must be based solely on the best scientific and commercial data available.

The Red Rock sunflower is threatened by at least three of these factors: (A) Habitat degradation and altered hydrology as a consequence of heavy recreational use and burro disturbance; (D) Inadequate regulatory mechanisms on BLM lands and lack of protection on private lands; and (E) Other factors including low reproductive success, climate change, the proliferation of invasive grasses, and the resultant rise in wildfire frequency and severity.

(A) PRESENT OR THREATENED DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT

INCREASING VISITOR TRAFFIC AT RRCNCA

Red Rock sunflower is undeniably and severely threatened by its proximity to extremely popular and heavily trafficked areas of Red Rock Canyon NCA. These impacts include trampling and fragmentation by human activity, hydrologic alteration, and potential introduction of invasive plant species, all of which degrade the species' habitat and have the potential to reduce available habitat. This sunflower's limited range and specific habitat requirements make it exceptionally vulnerable to habitat loss; therefore, the ongoing degradation to RRCNCA's alkaline desert springs should be considered one of the most severe and immediate threats to the species.

The Las Vegas metropolitan area is one of the fastest-growing population centers in the country. In the decade spanning 2000–2010, it underwent a 41.8% increase in population, the third highest in the country during that time,[3] and from 2023–2024, Clark County as a whole experienced the fifth-highest population increase in the nation, with over 44,000 new residents (US Census Bureau 2025). Las Vegas remains an incredibly popular destination for tourists as well, with the Las Vegas Convention and Visitors Authority reporting 41.6 million tourists in 2024 (LVCVA 2025). As Las Vegas grows, the popularity of RRCNCA has grown with it: the annual number of visitors to the NCA tripled between 1990 and 2012, and increased from 1 million in 2012 to 3.6 million in 2023 (USDOT 2012, 1; Poff 2024, 3). In 2024, approximately 2 million visitors were reported, though some of the annual difference in numbers between recent years may be in part due to changing methods for capturing traffic into the NCA (Poff et al. 2024, 4; Poff 2023, 3). Such a large volume of recreational activity places severe stress on these fragile desert ecosystems and the limited federal and private employees who are tasked with managing the lands and the tourists. Red Rock sunflower's location within one of the most popular areas of RRCNCA, the Calico Basin, makes it especially vulnerable to these threats.

The annual BLM Manager's Reports for RRCNCA have repeatedly expressed concern over the negative impacts of heavy recreational traffic on the NCA's natural and cultural resources, noting that the NCA has, in some years, seen visitation comparable to national parks like Yosemite and Zion despite having less than half the staff (Rothermel et al. 2022, 6). The growing popularity of the NCA has been mentioned as a challenge in all of the past five years' reports (2020–2024), with those reports and unpublished BLM documents both citing a wide range of both legal and illegal activity from the crowds: on- and off-trail hiking; rock climbing; horseback riding; mountain biking; and even remote-controlled car racing. With increasing popularity, the magnitude of impacts from these activities will only continue to grow.

[3] U.S. Geological Service Earth Resources Observation and Science (EROS) Center. "Las Vegas, Nevada, USA." https://eros.usgs.gov/earthshots/las-vegas-nevada-usa. Accessed 9 September 2025.

Figure 5. A well-formed social trail through a population of Red Rock sunflower. Credit: James Bailey 2023/iNaturalist.

SOCIAL TRAILS

The Calico Basin area of the NCA, where Red Rock sunflower grows, has seen a disproportionately large increase in popularity over the past few years (Bennett et al. 2022, 4), particularly among hikers and rock climbers (Rothermel et al. 2022, 7). Both of these activities have resulted in a proliferation of social trails through Red Rock sunflower's limited and fragile riparian habitat, representing one of the most concrete and visible threats to the species at this time.

Social trails are unofficial, user-created trails which deviate from officially-designated paths and become easier to see—and more damaging to the natural environment—as more people continue to notice and walk on them over time.[4] One population of Red Rock sunflower is crossed by multiple social trails which lead to a heavily-used climbing spot (BLM unpublished report #1, 7). Climbing-related social trails were considered a significant threat even in 2020, before the Red Rock sunflower had been formally described (Travers 2021, 22). These trails may be harder to rehabilitate and obliterate because more knowledgeable visitors may continue to take those routes even if they cannot immediately find the path. The BLM is working to install fencing around this population, but the project is not yet complete and there are concerns that some

[4] National Parks Service. "Social Trails…Not for Socializing." https://www.nps.gov/articles/000/social-trails.htm#. Accessed 11 September 2025.

visitors may simply go over the fence or that it will be otherwise ineffective (BLM unpublished report #1, 7).

Even official hiking trails and footpaths have unavoidable impacts on the natural environment. Footpaths themselves are formed in part by heavily compacting the soil, but soil compaction around footpaths is also higher when compared to areas of wilderness which are not close to a footpath or road (Chisholm and McCune 2024, 4). Habitat fragmentation, damaged and trampled vegetation, altered species composition, and a higher incidence of invasive or exotic species are also associated with trailside habitat, and contribute to the size of a trail's footprint on the surrounding environment. When a trail network passes close to populations of imperiled plants—as is the case for the populations of Red Rock sunflower which have been fragmented by social trails—these impacts are of particular concern (Pickering and Norman 2017, 271). The overall condition of RRCNCA's vegetation was ranked as "poor to good" for 2020, with the specific note that riparian areas—and their associated endemic plants—faced high impact due to recreational traffic (Travers 2021, 21). Social trails were cited in the same year as a significant cause of vegetation loss and fragmentation (p 22).

Because social trails increase the overall length of the trail network within a given area, their presence can dramatically increase the amount of related disturbance. One study at a popular hiking site in Argentina found, within an area of ~2.3 sq. km, a total of two formal trails and 32 informal trails (Barros and Pickering 2017, 6). An estimated 90% of the area was considered to be disturbed as a result, primarily by aggressive habitat fragmentation and a high incidence of off-trail vegetation trampling (p 7). Without the damage caused by informal trails, the authors estimated that only 8% of the site would be impacted—less than one tenth the observed disturbance (p 8). The random and unplanned nature of social trails means that they are often inefficient, crossing over and running alongside one another in a way which leads to redundancy in the network and worsens habitat fragmentation. This type of disturbance has specifically been observed in Red Rock sunflower habitat (BLM, unpublished report #1, 7; Fig. 5).

ALTERED HYDROLOGY AND WATER AVAILABILITY

Groundwater is a priceless natural resource in sustaining the lives of people, wildlife, and native plants in the desert. Unfortunately, its value and scarcity readily leads to conflict between water users and the environment. As climate change leads to worsening drought and lower surface water availability in many areas, and as the population of desert cities in the western US continues to grow, these conflicts will only worsen.

Declines in the water table will harm Red Rock sunflower and other desert spring endemics. As groundwater levels are lowered, the altered spring flow will interact with local geomorphologic features to change the distribution of wetlands, wetland-upland transition zones, and phreatophytic-upland zones (areas inhabited by deep-rooted plants that rely on groundwater)

around a spring (Patten et al. 2008, 7–8). This will affect which areas are suitable habitat for Red Rock sunflower, and may cause significant issues given the very narrow geographic range and small area of occupied habitat for the species.

Groundwater withdrawal could also result in a water table decline of between a few meters and tens of meters in the dry season (Patten et al. 2008, 8). According to modeling, shallow-rooted phreatophytes which are endemic to saline soils—similar to Red Rock sunflower—would be affected by a water table decline of even a few meters (p 9). The decline would also affect soil salinity, potentially furthering the alteration of the plant community at that location (*Id.*).

Less than 4 inches of water fall on the Las Vegas Valley floor each year (Pavelko et al. 1999, 50), and as a result, the city of Las Vegas has relied heavily on groundwater since its earliest days. The first flowing well was drilled in 1907, starting an era of intensive groundwater usage (p 52), and groundwater levels declined at a rate of 1ft per year from 1912–1944. From 1944–1963, total loss in some areas was upwards of 90 ft, and by 1962, many of the natural springs in the region had run completely dry (pp 53–54). This led to the extinction of the endemic Las Vegas dace (*Rhinichthys deaconi*) sometime between 1957 and 1967 (Miller 1984, 15) and local extirpations of several other fish species around the same time (Deacon et al. 2007, 691).

Extensive groundwater pumping continues to this day. Approximately 74,415 acre-feet were pumped from the groundwater reserves of the Las Vegas Valley in 2018, compared with a total groundwater resource of 97,598 acre-feet (Guillory et al. 2018, pp iii, 11). This pumped water is supplemented by massive amounts of imported water from the Colorado River—a total of 454,622 acre-feet in 2018 (p 9)—which underscores the severity of water scarcity in the valley and the knife's edge upon which desert spring plants currently rest. Anthropogenic water needs far outstrip available groundwater, but Las Vegas continues to expand, unchecked, in close proximity to RRCNCA and its imperiled alkaline springs. Endemic desert spring species are deeply imperiled by this continual urban and suburban growth.

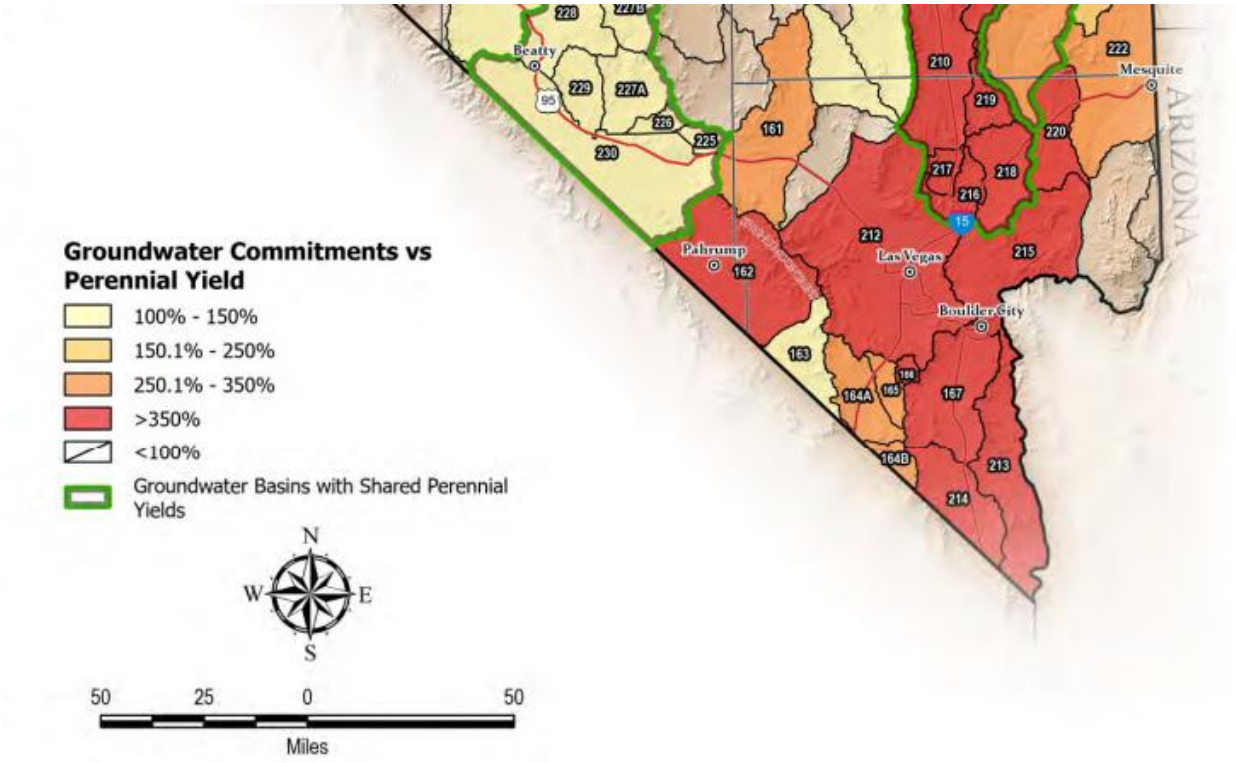

Figure 6. Groundwater commitments vs. perennial yield in southern Nevada. Source: NDWR 2023, 7.

Potential water use by water rights holders in the area is another concern for the riparian and desert spring ecosystems in RRCNCA and the Las Vegas Valley as a whole (Travers 2021, 20), because permitted water usage can theoretically far exceed available groundwater in southern Nevada. In 2007, valid groundwater rights existed which would allow rights holders to extract 376 percent of perennial groundwater yield in the Las Vegas Valley, alongside 331 percent of perennial groundwater yield in the neighboring Pahrump Valley (Deacon et al. 2007, 692). Those rights had increased to greater than 350 percent of perennial yield in Clark County in 2023 (NDWR 2023, 7; see Fig. 6). While actual usage is often far lower than total groundwater rights, in 2015/2017, Clark County still reportedly pumped more than 280 percent of its perennial yield (p 9). Permitted groundwater use alone is therefore able to completely decimate the desert springs where Red Rock sunflower grows, and is already operating at unsustainable levels in the county.

DISTURBANCE BY HORSES AND FERAL BURROS

Feral horses and burros roam much of the western United States, with a 2024 estimate suggesting that Nevada harbors ~51,000 wild horses—a vastly higher number than the estimated sustainable population of ~14,000 animals (NDOW 2024, 4). The presence of wild horses and burros on the desert landscape is commonly associated with heavy impacts to riparian ecosystems because the

animals stay close to accessible surface water (Tiller 1997, iii). This places riparian species and desert spring endemics like Red Rock sunflower in a particularly vulnerable position.

Figure 7. Photos of a spring taken in 2018 (left) and 2024 on a Horse Management Area that was at 300% capacity. Bare ground and erosion have markedly increased, while height and density of riparian vegetation have declined. Source: NDOW 2024, 6.

A study of grazed and ungrazed riparian areas in several Idaho Horse Management Areas (HMAs) found that cattle and wild horse grazing reduced plant height by 55% and live plant biomass by 62% (Kaweck et al. 2018, 49–50). Within the models of the study, horses had greater magnitude of impact than cattle on streambank alterations and on changes to biomass, while cattle had a greater impact on vegetation height. Both domesticated animals had a greater impact than native wildlife, due in part to their comparative abundance (p 50). In another study, areas grazed by feral horses in the sagebrush steppe of northwestern Nevada had seven times as much bare ground as ungrazed areas and 60% less litter cover (Boyd et al. 2017, 10).

Similarly, feral burros have been linked to extensive habitat damage through grazing, selective species removal, trampling, and soil disturbance (Tiller 1997, 3). A study in California found that half the instances of burro scat from a survey were recorded within 1 km of a water source (p 9). At one spring, “burro trails leading into the water hole have left the ground devoid of plant life” and a burro loafing area nearby had rendered a 10 m x 10 m plot with no remaining live vegetation (p 11). Another spring site had healthy vegetation only where burros were naturally excluded by features of the landscape, and 95–100% bare ground where burro use was high (p 15). Burro damage extended out from the riparian zone into the xeric plant communities of the surrounding area as well (*Id.*). It is clear that both feral horses and feral burros can have a profound effect on desert spring habitats.

Red Rock sunflower's proximity to springs makes it vulnerable to trampling, browsing, soil compaction, and erosion by feral herbivores. Calico Basin is included within the Red Rock HMA managed by the BLM. Managers have determined that the Red Rock HMA can sustainably support 16–27 wild horses and 29–49 wild burros (USFS and BLM 2022, 2), but the number of animals occupying the land can increase by 15–20% each year (p 3). There have been frequent "emergency gathers" in Red Rock and neighboring HMAs, often of one to several hundred animals, due to water scarcity or private property concerns (*Id.*), illustrating how rapidly herd size can recover even with semi-frequent population control measures.

Although in 2021 there were only an estimated 62 horses and 43 burros in Red Rock HMA (USFS and BLM 2022, 3), by 2024 there were at least 114 adult wild horses and 191 burros within and directly outside the HMA.[5] That year, the BLM conducted a gather which removed 100 horses and 70 burros from the land.[6] Based on these numbers, there may still be more than 100 burros in the HMA, at least twice the appropriate number, despite frequent management activity.

Tame horses and equestrian activity represent another threat to Red Rock sunflower. Although horseback riding is itself permitted within Calico Basin, visitors on horseback are often observed directly in the riparian areas of this sensitive habitat—where they are not allowed (BLM unpublished report #1, 2). Horses can trample fragile plants and, in the opinion of one botanist with the BLM, represent a serious weed hazard as they can transport invasive seeds from feed into the NCA in their excrement or on their coats and hooves (BLM unpublished report #2, 3). Their presence in the washes and riparian areas presents a direct threat of trampling, soil compaction, and non-native weed introduction to Red Rock sunflower.

(D) INADEQUACY OF EXISTING REGULATORY MECHANISMS

FAILURE BY THE BLM TO PRIORITIZE CONSERVATION AT RRCNCA

The RRCNCA does not presently have the resources to fully survey, manage, and protect its fragile desert ecosystems, including Red Rock sunflower populations and habitat. One internal report points out that RRCNCA has seven Outdoor Recreation Specialists for Red Rock Canyon; in contrast, there is only one botanist, who alone is responsible for vegetation management, restoration, and invasive species, for both RRC and the neighboring Sloan Canyon (BLM unpublished report #2, 4).

Even with so many more staff focused on recreation, there seems to be little ability to prevent unlawful or unauthorized recreational use of the NCA. This is documented throughout

[5] https://www.blm.gov/announcement/bureau-land-management-will-begin-red-rock-hma-wild-horse-and-burro-bait-and-water.
[6] https://www.blm.gov/announcement/blm-concluded-red-rock-hma-wild-horse-and-burro-bait-and-water-gather-operation.

RRCNCA's annual managerial reports, which cite the high number of visitors as a growing concern (e.g., Travers 2021, 18; Rothermel et al. 2022, 6). This inability to protect natural resources is of great concern. The 2020 manager's report stated, "Riparian and wetland ecological systems comprise only a small portion of the RRCNCA, but they are among the most important, productive, and diverse ecosystems on the landscape" (Travers 2021, 19). Unfortunately, despite their value, they were found to be in "Declining" condition (*Id.*) due to recreational impacts. If even these relatively small locations within the NCA cannot be protected at present, the overworked RRCNCA staff cannot be expected to make an even finer-grain management plan to protect individual elements of those ecosystems like the Red Rock sunflower.

It is also perhaps worth noting that the annual manager's reports for the past 5 years have gotten progressively shorter and shorter, with 2020's report being 40 pages and 2024's being only 10 (Travers 2021; Bennett et al. 2021; Rothermel et al. 2022; Poff 2023; Poff et al. 2024). The detail level in each report seems to suggest that the NCA staff's capacity to assess the status of its various natural resources on an annual basis is in heavy decline, though it is not clear why. This may be due to staffing shortages, funding cuts, or internal decisions on how to prioritize different aspects of management, or it may simply reflect the soaring popularity of the NCA and the inability for BLM staff to focus on much else. Regardless, it is clear that RRCNCA does not presently have the resources to protect Red Rock sunflower from extinction.

CALICO BASIN RECREATION AREA MANAGEMENT PLAN (RAMP)

The Calico Basin Recreation Area Management Plan (RAMP) was completed in 2022 as a means to replace the Calico Basin management plan and EA from 2003, which the BLM determined was no longer adequate to address the resource impacts and operational issues caused by increasing visitor numbers (BLM 2022, I-2).

The RAMP mentions Red Rock sunflower only briefly, simply stating, "A newly described plant species in the Helianthus genus of the Asteraceae family grows in alkaline outcrops along two riparian drainages in the Calico Basin planning area … Little is known about this species at this time." (BLM 2022, 4-10). It is not included as a BLM Special Status Species in the RAMP (p 4-17), nor is it included under a list of special status plants which should receive particular consideration due to the impacts of increased recreation on their habitat (p I-9). One of these species, the alkali mariposa lily (*Calochortus striatus*), has similar habitat to Red Rock sunflower and faces very similar threats: the species is reportedly "stable within the fenced area and almost denuded out of the fenced area. Suitable habitat for the alkali mariposa lily outside the fenced area has been subject to grazing by burros and heavy recreational traffic from hikers and picnickers" (p 4-14). This is a good indicator of the need for greater management of Red Rock sunflower's habitat, as there are no fenced areas where this species grows. It is likely that all of Red Rock sunflower's habitat is presently being subjected to the same pressures as the

unfenced populations of alkali mariposa lily, but it has not had any of its habitat protected and is not prioritized within the Calico Basin RAMP. This document and the policies it lays out are insufficient to protect Red Rock sunflower or its habitat.

NEVADA DIVISION OF FORESTRY REGULATIONS

Endangered plants are managed at the state level by the Nevada Division of Forestry (NDF), which elected in December 2024 to add the Red Rock sunflower to the list of fully protected Critically Endangered species. Unfortunately, NDF is poorly positioned to enforce the protection of listed plants. That is particularly true for those which are located primarily on federal lands, as is the case for Red Rock sunflower.

Endangered plants are covered under Nevada Revised Statutes (NRS) 527, though their list has not been updated to include the Red Rock sunflower as of 19 November 2025[7] despite a draft from the end of June 2024 showing this rare flower included.[8] Species of native flora can be protected under law in Nevada when, "the State Forester Firewarden… determines that its existence is endangered and its survival requires assistance… because its habitat is threatened with destruction, drastic modification or severe curtailment."[9] The substantive protection provided for fully protected species of native flora is that, "no member of its kind may be removed or destroyed at any time by any means except under special permit."[10] Anyone who proposes to undertake activities which are otherwise lawful but will result in the destruction of a protected plant incidental to the action the person is undertaking must obtain a permit.[11]

NDF requires a permit when a project will result in the taking of plants listed as Critically Endangered under their authority. Unfortunately, this does not mean that permits will not be granted when listed plants are imperiled. In fact, the permit application states that "[t]he State Forester may issue a permit … to conduct a project that may involve the taking of a plant on the list of fully protected species of native flora only if: The proposed project is for scientific purposes … or The proposed project involves an otherwise lawful activity and the proposed taking is incidental to, and not the purpose of, the project."[12] Per this language, NDF is free to approve any activity which would affect Red Rock sunflower, so long as the destruction of this rare plant is not the stated goal of the activity.

Moreover, none of the threats which face the Red Rock sunflower are activities which would qualify as needing a permit. Threats facing the sunflower from visitors, altered hydrology, disturbance by feral equids, climate change, and wildfires are not projects which require a permit

[7] NAC 527.010.
[8] https://www.leg.state.nv.us/Register/2024Register/R154-24I.pdf.
[9] NRS 527.270.
[10] *Id.*
[11] NAC 527.250, 527.260(1).
[12] https://forestry.nv.gov/uploads/missions/20220629_AMT_Permit_to_Take_Critically_Endangered_Species_Application.pdf.

from NDF. They are either factors under the direct management authority of BLM or global factors outside the scope of an individual agency's mandate. Thus, the Nevada state-level protections for the Red Rock sunflower do not actually address any of the threats by the plant, and do not represent a meaningful level of protection—or really any level of protection at all.

(E) Other natural or manmade factors affecting survival

Potentially low reproductive success and small populations

No formal studies have been conducted on reproductive biology of Red Rock sunflower, but surveyors have noted a conspicuous absence of young plants which indicates that *in situ* reproductive success may be low. Although a germination experiment with wild-collected seeds from 2023 yielded a 44% germination success rate following a 24-hour soak *ex situ*, only one young plant has ever been discovered in four years of surveying (BLM unpublished report #2, 2) and natural germination rates were described as "negligible" for the species (BLM unpublished report #1, 7). Therefore, limited reproductive success (possibly unrelated to germination success) is a likely threat to this flower.

Small populations can also face genetic consequences, including inbreeding and associated loss of genetic diversity, which can impact long-term fitness and stability at that site and ultimately contribute to stochastic losses (Ellstrand and Elam 1993, 219). One study of rare plants found an extirpation rate of 27% over ten years, with highest rates of extinction for the smallest (<100 individuals) and most isolated populations (Matthies et al. 2004, 484). Although two populations of Red Rock sunflower are larger than this, one is precariously small (<10 individuals). Minimum population size necessary for a 90% probability of survival after 10 years varies by species, ranging from 71–1,276 (p 483). This minimum population size for Red Rock sunflower is unknown, but with the entire species limited to fewer than 1,000 plants and negligible germination occurring, there is a definite risk of stochastic loss.

The small size of Red Rock sunflower populations may be a contributing factor to its apparently low reproductive success rate. For the rare flowering plant *Primula veris*, flowers from plants in large populations produced significantly more fruits than flowers from plants in small populations (Kéry et al 2000 , 21). Another rare plant, *Gentiana lutea*, did not show a relationship between number of seeds and population size, but did show a higher rate of seed abortion in small populations which led to a similar effect on the number of potentially viable seeds (p 23). Plants from larger populations of both species had higher fitness than those from smaller populations (p 25). Both *P. veris* and *G. lutea* are obligate out-crossing species which cannot self-pollinate, which may contribute to lower success of seeds in small populations or lead to inbreeding depression over time (p 27). Although Red Rock sunflower is not known for certain to be an obligate out-crossing species, many members of *Helianthus*, both annual and perennial, show near-zero rates of self-fertilization (Atlagić and Terzić 2016); therefore, the

same concerns outlined by Kéry et al. are likely to affect Red Rock sunflower population size and success.

CLIMATE CHANGE AND DROUGHT

Arid and semiarid ecosystems across the western US face widespread ecological alteration as a consequence of global climate change. In the Mojave Desert, where Red Rock sunflower is found, the climate has become markedly drier and hotter in the past few decades. Annual precipitation in 2000–2021 was 8.3% below the 1950–1999 average, while average temperature was 0.91°C higher when compared within the same timeframes (Williams et al. 2022, 232).

In the twentieth and twenty-first centuries, the Mojave Desert and other warm deserts in North America have experienced a broadly similar pattern of alternating dry and wet periods, likely due in part to global-scale climate fluctuations such as El Niño-Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (Hereford et al. 2006, 15). The current period, which began in 1999, is an episode of severe drought. A recent reconstruction of past climate conditions has revealed that the 22-year period from 2000–2021 is the driest period in the region since approximately the year 800 CE (Williams et al. 2022, 232). This present-day megadrought is a concern for Red Rock sunflower, as 2021 was a year of extremely dry soils (*Id.*) and this plant, despite being associated with springs, is ultimately reliant on moist soils to persist. Williams et al. used climate-model simulations from the Coupled Model Intercomparison Project Phase 6 to determine that anthropogenic climate change accounted for 42% of the soil moisture anomaly in the period of 2000–2021 and 19% of the soil moisture anomaly in 2021 alone (p 234). If these trends of dry soil continue, Red Rock sunflower will be unlikely to persist.

Red Rock sunflower, as an extremely narrow endemic, is particularly vulnerable to changing habitat suitability under climate change. As patterns of precipitation and temperature shift, plant populations must also be able to move across the landscape in order to stay within areas of suitable habitat (Corlett and Westcott 2013, 482). If populations cannot shift fast enough, they risk being extirpated (*Id.*). Red Rock sunflower is unlikely to successfully make such a migration for several reasons. For one, it is reliant on desert spring habitat, and seed dispersal is unlikely to bridge the gap from one desert spring to another, particularly if the entire Calico Basin becomes unsuitable. For another, there is seemingly very little reproduction occurring for this species, and migration of plant populations requires reproduction so that new seedlings can establish in areas of more suitable habitat. As climate continues to change in the Mojave Desert, Red Rock sunflower will become increasingly imperiled and more likely to face unsuitable conditions which could lead to extinction. It is also vulnerable to disturbances with larger areas of effect, such as droughts or wildfires, which could easily wipe out the entire species.

INVASIVE SPECIES AND NOXIOUS WEEDS

Red Rock Canyon is host to a staggering number of introduced and invasive species. The disproportionately high number of out-of-state visitors to RRCNCA is part of the reason for such a high volume and variety (Travers 2021, 22). In particular, invasive annual grasses are a severe issue throughout the western US, where they can crowd out native species and cause increased wildfire frequency by providing abundant fine fuels. The most prolific invaders are disturbance-tolerant generalists which can then readily re-colonize areas that have been burned by wildfire, creating a worsening fire cycle to which native plants are not adapted (Brooks and Matchett 2006, 149).

Brooks and Berry (2006) found that non-natives were the dominant annual biomass in the Mojave Desert regardless of rainfall, though in a low-rainfall year they comprised 91% of the annual biomass and in a high-rainfall year they comprised only 66% (p 108). The high biomass came from a few very prolific species, most notably annual bromes (*Bromus* spp.) and Mediterranean grass (*Schismus* spp.). Disturbance variables were a more ready correlate of invasive plant dominance, with frequency and size of wildfires being a good predictor of the biomass of *B. rubens* in a dry year (p 110). As climate change continues to affect rainfall in the Mojave desert (Smith et al. 2023, these conditions will encourage the proliferation of species like *B. rubens* and the resultant intensity and frequency of wildfires (Brooks and Matchett 2006). Within RRCNCA, fire scars throughout the lower elevation creosote bush community are already largely dominated by invasive annual grasses (Travers 2021, 22), and the encroachment of invasives into Red Rock sunflower's very narrow habitat has been documented (BLM, unpublished report #1, 2).

Nevada State listed noxious weed species found in RRCNCA include Malta starthistle (*Centaurea melitensis*), giant reed (*Arundo donax*), saltcedar (*Tamarix ramosissima*), Sahara mustard (*Brassica tournefortii*) Silverleaf nightshade (*Solanum elaegnifolium*), and puncturevine (*Tribulus terrestris*).

There are also species in RRCNCA that are non-native and invasive yet have not been legally designated as noxious by the State of Nevada. In addition to the invasive brome species (*Bromus tectorum, Bromus diandrus, Bromus rubens*, and *Schismus* spp.), London rocket (*Sisymbrium irio*), crossflower (*Chorispora tenella*), African mustard (*Malcolmia africana*), curveseed butterwort (*Ranunculus testiculatus*), common dandelion (*Taraxacum officionale*) Jersey cudweed (*Gnaphalium luteoalbum*), and Russian thistle (*Salsola* spp.) have been documented in the NCA. The first documented detection of woolly distaff thistle (*Carthamus lanatus*) in Nevada was within RRNCA. The NCA has 35 named seeps and springs and at least as many un-named ones. Saltcedar and Russian olive (*Elaeagnus angustifolia*) are the primary weed species identified in the inventoried springs. Surveys showed that horehound (*Marrubium vulgare*) is still present in Kiup Spring. Giant reed and sweetclover (*Melilotus* Mill.) continue to be treated

in La Madre Spring, puncturevine and dallisgrass (*Paspalum dilatatum*) are under active treatment at Willow Springs. Puncturevine occurs along many of the social trails around Pine Creek and at Oliver Ranch (Travers 2021, 16).

In or around the Red Rock sunflower populations, the invasive plants include Sahara mustard, fountaingrass (*Pennisetum setaceum*), Russian thistle, tamarisk, puncturevine, Russian olive, field bindweed (*Convolvulus arvensis*), sweetclover, Mediterranean grass (*Schismus* spp.), red brome, ripgut brome, and cheatgrass (*Bromus* spp.) (BLM, unpublished report #1, 2). The BLM reportedly removed around 2 tons of Sahara mustard recently, yet still feels that current efforts to remove invasive plants are "insufficient" (p 8).

WILDFIRES

Changing wildfire regimes in the western US have been observed as a consequence of increasing temperature and drought due to climate change, often aided by the proliferation of invasive annual grasses (Brooks and Matchett 2006; Wilder et al. 2021).

Within the Mojave Desert, the most common natural cause of wildfires is lightning strikes, though those mostly occur at higher elevations (Brooks and Matchett 2006, 153); in low- and mid-elevation ecosystems, the main cause of wildfire is human activity (*Id.*). Between 1972 and 2010, there were approximately 250 wildfires in the Mojave Desert which were larger than 1000 acres (1.5 sq mi) (Klinger et al. 2021, 8). In 2023, the York Fire in Mojave National Preserve burned 77,000 acres (~120 sq mi); several years before that, the nearby Dome fire burned 40,000 acres. Both fires were fed in part by invasive grasses which had overgrown the empty space between native species due to a particularly wet winter.[13] In RRCNCA, the much smaller Bird Springs wildfire (~120 acres) was ignited in 2024 as a result of illegal target shooting, which is apparently a common occurrence.[14] Most of the fires in RRCNCA have anthropogenic ignition sources in or near areas with high invasive grass coverage (Travers 2021, 15).

Red Rock sunflower is threatened by wildfire to the extent that many desert endemics are, where the chance ignition of dry fuels could lead to a wildfire enveloping a species' entire range. The Bird Springs wildfire, which was much smaller than other fires in the Mojave Desert from recent years, still burned an area twice the size of Red Rock sunflower's estimated geographic range of 0.25 sq km.

[13] Margolis, J. (31 July 2023). "Wildfires Were Rare in the Mojave Desert. A Record-Breaking Fire Shows Why That's Changing." *LAist.* https://archive.is/5cScv.
[14] FOX5. (27 May 2024). "Bird Springs Wildfire 100% Contained; Officials Determined Cause of Fire." https://www.fox5vegas.com/2024/05/27/25-acre-wildfire-reported-southwest-las-vegas-near-boulder-highway/.

REQUEST FOR CRITICAL HABITAT DESIGNATION

Critical habitat as defined by Section 3 of the ESA is: "(i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) the specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species." (16 U.S.C. § 1532(5)).

Congress recognized that the protection of habitat is essential to the recovery and/or survival of listed species, stating that: "classifying a species as endangered or threatened is only the first step in ensuring its survival. Of equal or more importance is the determination of the habitat necessary for that species' continued existence... If the protection of endangered and threatened species depends in large measure on the preservation of the species' habitat, then the ultimate effectiveness of the Endangered Species Act will depend on the designation of critical habitat." H. Rep. No. 94-887 at 3 (1976).

The Center requests that the Service propose to designate critical habitat for all areas occupied by Red Rock sunflower concurrently with the flower's proposed listing. Protecting Red Rock sunflower without designating critical habitat will not be sufficient to ensure this species' survival.

CONCLUSION

The best available scientific data strongly indicate that Red Rock sunflower is at imminent risk of extinction. Its precariously small populations show little to no evidence of reproduction, despite seeds germinating *ex situ*, which could be an indicator of poor habitat quality or an early sign of inbreeding depression or reduced fecundity due to small population sizes. Fewer than 1,000 plants exist, all within a small area, placing the species at risk from stochastic loss of diversity or singular catastrophic events.

This sunflower is found only at a few alkaline desert springs on public land, in an area of southern Nevada which is overwhelmed by impacts from tourism and wild equines and threatened by ongoing drought, wildfires, and climate change. Endangered Species Act protections and critical habitat designation are gravely needed to ensure this fragile plant's small habitat is protected from further fragmentation by trampling and to give the BLM the resources to safeguard all populations.

The ESA requires that the Service promptly issue an initial finding as to whether this petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. § 1533(b)(3)(A).

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