

BEFORE THE SECRETARY OF THE INTERIOR

**PETITION TO THE U.S. FISH AND WILDLIFE SERVICE TO PROTECT
ARIZONA ERYNGO (*Eryngium sparganophyllum*)
UNDER THE ENDANGERED SPECIES ACT**



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CENTER FOR BIOLOGICAL DIVERSITY

Notice of Petition

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Petitioner

The Center for Biological Diversity is a national, nonprofit conservation organization with more than 1.6 million members and supporters dedicated to the protection of endangered species and wild places.

<http://www.biologicaldiversity.org>

Failure to grant the requested petition will adversely affect the aesthetic, recreational, commercial, research, and scientific interests of the petitioning organization's members and the people of the United States. Morally, aesthetically, recreationally, and commercially, the public shows increasing concern for wild ecosystems and for biodiversity in general.



April 2, 2018

Dear Mr. Zinke:

Pursuant to Section 4(b) of the Endangered Species Act (“ESA”), 16 U.S.C. §1533(b), Section 553(3) of the Administrative Procedures Act, 5 U.S.C. § 553(e), and 50 C.F.R. §424.14(a), the Center for Biological Diversity, Maricopa Audubon Society, Robin Silver, and Tierra Curry hereby formally petition the Secretary of the Interior, through the United States Fish and Wildlife Service (“FWS”, “the Service”) to list ribbonleaf button snakeroot, also called Arizona eryngo, (*Eryngium sparganophyllum*) as a threatened or endangered species under the Endangered Species Act and to designate critical habitat concurrently with listing. The U.S. Fish and Wildlife Service has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on FWS. Specifically, FWS 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. Petitioners need not demonstrate that listing is warranted, but instead petitioners must only present information demonstrating that such listing may be warranted. While the petitioners believe that the best scientific information demonstrates that listing is in fact warranted, it is clear based on the available information that listing the plant may be warranted. As such, FWS must promptly make an initial finding on the petition and commence a status review as required by 16 U.S.C §1533(b)(3)(B).

On behalf of all petitioners,

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EXECUTIVE SUMMARY

Arizona eryngo, also called ribbonleaf button snakeroot, (*Eryngium sparganophyllum*), is an extremely rare plant in the carrot family that can grow to be more than five feet tall with cream-colored spherical flower heads in large, open inflorescences. The plants grow only in a specific type of permanently wet spring habitat called a “ciénega” and now survive at just two sites in the United States in far southern Arizona-- in the Lewis Springs ciénega within the San Pedro Riparian National Conservation Area, and at La Cebadilla ciénega in Tucson. It is under high magnitude imminent threat of extinction due to habitat degradation from declining groundwater levels, drought, and climate change. The Arizona Native Plant Advisory Group ranks Arizona eryngo as one of the most endangered plants in the state. This petition seeks Federal protection for the critically imperiled species. We review the available scientific information and then in the context of the five listing factors of the Endangered Species Act, we detail the reasons that it is facing extinction in the foreseeable future and demonstrate that no mechanisms are in place to adequately protect it and that it thus warrants listing under the Endangered Species Act.

INTRODUCTION

Both Arizona eryngo and the wetland habitat type on which it is obligate are endangered and unprotected. “Ciénegas” are a special type of wetland unique to the Southwest, with high archaeological and biological value that provide crucial refugia for fish, amphibians, invertebrates, and migratory birds within the arid landscape (Minckley et al. 2013). Ciénega habitat has been greatly reduced over the last 150 years and many are now only remnants with a precarious future in the absence of protection and restoration efforts (Makings 2006, p. 15).

Despite recent surveys across its historic range in the United States, Arizona eryngo appears to have been extirpated from all but two ciénegas (Makings et al. 2015). Lewis Springs is a small ciénega that is less than two acres in size (Makings 2013). It is highly important from a biodiversity standpoint but also highly threatened by groundwater depletion. La Cebadilla ciénega is three acres in size and occupies a portion of a ten-acre altered wetland complex. Both of these sites need immediate protective measures to ensure the surface water availability that this endemic plant depends on for survival.

Arizona eryngo is important for several reasons. It is an indicator plant for the health of ciénega habitats. Its conspicuous flowers are of high value for an impressive diversity of pollinators including hummingbirds and invertebrates (Makings et al. 2015). It is also of particular interest from a scientific standpoint and is

considered by botanists to be an enigma due to its complex and unique morphology. From a sheer aesthetic perspective, it is a lovely plant with elegant angles and visually striking flowers. We urge the U.S. Fish and Wildlife Service to enact immediate Endangered Species Act protection for this special plant so that it survives for future generations.



Tiny checkerspot butterfly (*Dymasia dymas*) foraging on Arizona eryngo © Elizabeth Makings

NATURAL HISTORY

Description and Taxonomy

Arizona eryngo (*Eryngium sparganophyllum* Hemsl.), also known as ribbonleaf button snakeroot, is a perennial flowering plant in the carrot family. It is recognized as a valid species (Kartesz 1994). Its Integrated Taxonomic Information System Serial Number is 29504 (ITIS 2018).

Kingdom	Phylum	Class	Order	Family	Genus
Plantae	Anthophyta	Dicotyledoneae	Apiales	Apiaceae	Eryngium

Makings (2006) provides the following description:

Perennial scapose forb to 1.5 m; leaves elongate and linear, parallel-veined, in basal rosette, to 50 cm long; flowers cream, in dense, globose heads at ends of dichotomously branching scapes; fruit ovoid, seeds flattened, covered with hyaline scales or tubercles. Flowering August-September.

The Arizona Game and Fish Department (AZGFD 2004) provides the following description:

Perennial scapose herb with tall stems, 4-12 dm (16-47 in) high, dichotomously branching. Linear leaves in a basal rosette, 1-9 dm (4-35 in) long, 5-15 mm wide, entire (rarely with 1 or 2 bristle teeth), tapering to a point; strongly involute when dry. Cauline leaves few and reduced. Inflorescence branching, flower heads ovoid or ovoid-oblong, 12-25 mm long, 10-15 mm broad, with 8-12 short ovate-lanceolate bracts and similar bractlets; bractlets 5 mm long, slightly exceeding the fruit. Fruit ovoid, 3-4 mm long, with large scales at the angles, and smaller ones between.

The New Mexico Rare Plant List (2013) provides the following description:

Herbaceous perennial with a basal rosette of leaves and a scapose stem to 1.5 m tall; basal leaves linear, up to 1 m long, entire or rarely with one or two spinose teeth; cauline leaves few and reduced; inflorescence a compound umbel with compact head-like umbels terminating the branches; heads ovoid or ovoid-oblong, 12-25 mm long, 10-15 mm wide, with several ovate or lanceolate basal bracts and similar, but smaller bractlets within the head that barely exceed to the length of the fruits; corolla cream colored or bluish purple; fruit ovoid, 3-4 mm long with scales at the angles and smaller scales between.

Range

In the United States, Arizona *eryngo* was once found at multiple sites in Arizona and New Mexico but is now known from only two locations in southern Arizona (Figure 1). Within Arizona, its range now includes one site in Pima County just west of Tanque Verde Wash in the Santa Cruz River basin, and one site in Cochise County in the San Pedro Riparian National Conservation Area on the Upper San Pedro River floodplain (AZGFD 2004, Makings et al. 2015).

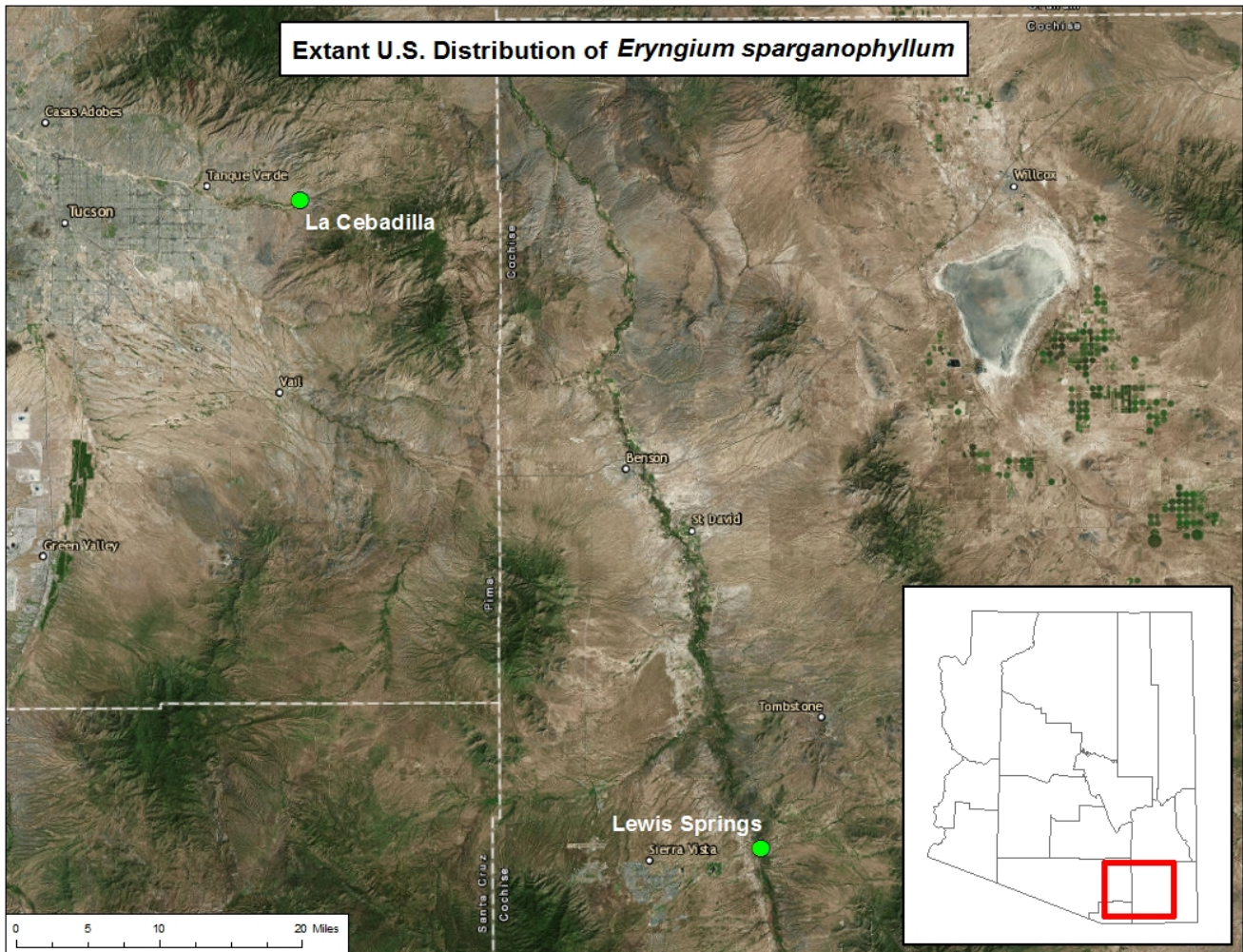


Figure 1. Map of extant *Eryngium sparganophyllum* populations in the United States. This rare wetland plant appears to have been extirpated from all but two U.S. sites.

Despite recent surveys, the plant has not been detected in New Mexico since 1851 and is likely extirpated from the state (Roth Personal Communication 2017).

In Mexico, the distribution of the plant appears to be highly disjunct with a known population in Chihuahua and another in Sonora and then a gap of more than 500 miles to the region where Durango, Jalisco, Nayarit and Zacatecas adjoin (New Mexico Rare Plant List 2013). Garcia-Ruiz (2013) reports that there are very few

records from Michoacán and that populations are small, restricted, and made up of a few isolated individuals from two locations in la Sierra del Centro (p. 105, 110, 112).

An assessment of populations in Mexico is underway. There may only be two populations of *Arizona eryngo* in Mexico as the disjunct southern populations may represent a different species than the northern populations and true *E. sparganophyllum* may only be found in Chihuahua and Sonora. The status of the population in Chihuahua is unknown. The population at Agua Caliente in the Río Bavispe basin in Sonora appears healthy (Sanchez Escalante Personal Communication 2018). A site visit in 2017 to a third potential site, Ojos de Arrey, a once-large spring complex in the Rio Santa Maria drainage south of Galeana where biologists thought *Arizona eryngo* could potentially occur based on habitat conditions, found that the condition of the wetland was one of total deterioration, apparently caused by over-exploitation of the aquifer (Sanchez Escalante Personal Communication 2018).

Status

Arizona eryngo is ranked as critically imperiled globally (G1G2) by NatureServe (2016) due to significant habitat losses of its obligate ciénega wetlands. It is ranked as state historical (SH) in New Mexico and critically imperiled (S1) in Arizona. It is ranked as nationally imperiled in the United States (N1) and is unranked in Mexico (NR).

The New Mexico Rare Plant List (2013) describes *Arizona eryngo* as “rare and endangered” in the United States and rarely collected in Mexico.

The Arizona Rare Plant Advisory Group (2014) categorizes the plant as “Very High Concern,” their highest imperilment category used for “the most endangered plants in Arizona” (p. 11). The rank is based on its high endemism, low number of occurrences, low abundance, high habitat specificity, and decreasing trend (Laurenzi and Spence 2013, p. 18).

At least two population sites are known to have been lost including Agua Caliente in the Santa Cruz River basin near Tucson and Las Playas Springs in New Mexico.

The small number of remaining populations, two in Arizona and only one or two populations in Mexico, are under threat from declining groundwater and are in need of protection.

Habitat

Arizona eryngo grows in organic muck and silty clay-loam in marshy areas known as ciénegas, a name given to riparian marshlands in the Southwest by Spanish explorers. Ciénegas are groundwater-fed wetlands in the desert landscape. In a pivotal paper highlighting the importance and imperilment of ciénega habitats, Hendrickson and Minckley (1985) describe ciénegas as mid-elevation wetlands characterized by permanently saturated, highly organic, reducing soils and stable, persistent aquatic climax communities. Ciénegas are perpetuated by permanent, scarcely-fluctuating sources of water, are rarely subject to harsh winter conditions, and are near enough to headwaters to reduce the probability of experiencing scouring floods (p. 133). Ciénegas act as traps for organic materials and nutrients in the aquatic ecosystem, and are remarkably

productive, attracting herbivore and insect communities (Hendrickson and Minckley 1985, p. 134; Makings 2016).

Cole and Cole (2015) define ciénegas as:

freshwater or alkaline wet meadows with shallow-gradient, permanently saturated soils in otherwise arid landscapes that in earlier time supported lush meadow grasses and often occupied the entire widths of valley bottoms. Ciénegas occur because the geomorphology forces water to the surface, and historically they covered large areas rather than occurring as single pools or channels. Ciénegas are usually associated with seeps or springs and are occasionally found in canyon headwaters or along the margins of streams. In a healthy ciénega, water slowly migrates through long, wide mats of thick, sponge-like wetland sod. Ciénega soils are squishy, permanently saturated, organic, anaerobic, and black (p. 28, citations omitted).

Ciénegas are remarkable for their location in dry lands and their association with groundwater discharge, which gives them permanence, stability, and biogeographic isolation, making them highly important from a biodiversity standpoint (Cole and Cole 2015, p. 29, 30).

AZGFD (2004) provides the following description of the plant communities associated with Arizona eryngo:

Pinyon-Juniper and Madrean Evergreen Woodlands, and Desertscrub. Associates include: *Anemopsis californica* (yerba mansa), *Arbutus* sp. (madrone), *Asclepias subverticillata* (horsetail milkweed), *Carex praegracilis* (clustered field sedge), *Eleocharis* sp. (spikerush), *Helianthus annuus* (annual sunflower), *Juncus balticus* var. *montanus* (mountain rush), *Juncus* sp. (rush), *Lobelia cardinalis* (Cardinal flower), *Lythrum californicum* (California loosestrife), *Schoenoplectus (=Scirpus) americanus* (American bulrush), and *Sisyrinchium* sp. (blue-eyed grass).

Arizona eryngo has been reported at elevations from 2,720 – 4,000 feet (830-1220 m) in Arizona, and 4,500-5,000 feet (1373-1525 m) in New Mexico (AZGFD 2004).

There are only two U.S. sites where Arizona eryngo is known to persist, La Cebadilla Ciénega and Lewis Springs.

La Cebadilla Ciénega is located east of Tucson, Arizona along Tanque Verde Wash. It is 1.3 hectares in area (Wolkis 2016, p. 19) and is part of a larger wetland complex known as La Cebadilla owned by Pima County that is 4 hectares in size that is fed by a spring located on private property to the north (SWCA 2002).

The Lewis Springs Ciénega is approximately 0.8 ha in size and is just east of the San Pedro River and just south of the Lewis Springs/Government Draw drainage on the side of a small slope (Makings 2013, p. 74).

ENDANGERED SPECIES ACT PROTECTION IS WARRANTED

The Endangered Species Act states that a species shall be determined to be endangered or threatened based on any one of five factors (16 U.S.C. § 1533 (a)(1)). Arizona eryngo is threatened by at least three of these factors and thus qualifies for federal protection. The species is threatened by modification or curtailment of

habitat or range, other factors that diminish its chance for continued existence including climate change, and lack of existing regulatory mechanisms to protect it from these threats.

THREATS

Modification or Curtailment of Habitat or Range

Habitat loss and degradation primarily due to hydrological alterations is a high magnitude, imminent threat to Arizona eryngo across its range in the United States and Mexico. Since the late 1800s, natural wetland habitats in the arid desert grasslands of Arizona, New Mexico, and Northern Mexico have largely been eradicated and now make up only around 5 percent of their original extent (Cole and Cole 2015, p. 29, 33). Cole and Cole (2015) identify primary factors that have driven the degradation and eradication of wetland habitats in the Southwest: cattle and sheep grazing, beaver eradication, agricultural re-contouring and aquifer depletion, drought, fire suppression, and climate change (p. 32-33).

Arizona eryngo grows only in a specific type of wetland known as a ciénega. Ciénegas are one of the most endangered habitat types in the American Southwest and northwestern Mexico, and many are now only remnants of their historical condition (Makings 2013, p. 75). Hendrickson and Minckley (1985) estimate that more than 95 percent of ciénegas have been lost. Cole and Cole (2015) report that ciénega habitats are themselves endangered and at risk of becoming extinct (p. 28).

Multiple factors have contributed to the decline of ciénegas including overgrazing, altered patterns of water infiltration and runoff, increases in flood intensity, reductions in stream base flows, groundwater pumping, surface water diversions, stream channel incisions, extirpation of beavers, drought, and climate change (Minckley et al. 2013, Wolkis 2016, p. 2-3).

Multiple documented populations of Arizona eryngo have already been extirpated, and it is likely that many others were extirpated due to dewatering of wetlands in the region without scientists having the opportunity to document the occurrences (Makings 2013, p. 75).

Arizona eryngo appears to be extirpated from New Mexico. The only documented population, from Las Playas Springs, was lost when the springs dried up due to multiple factors including groundwater pumping for irrigated agriculture, diversions for livestock, domestic consumption, and the mining and smelting of copper (New Mexico Rare Plant List 2013, Makings et al. 2015).

The population from Agua Caliente in Tucson was degraded by spring modification for the development of a resort, resulting in the extirpation of the population. The property underwent numerous manipulations of hydrology, topography, and vegetation (SWCA 2002, p. 14).

The remaining U.S. populations are under threat. Lewis Springs is a small ciénega that is less than two acres in size (Makings 2013). The Lewis Springs Ciénega is threatened by multiple factors including unrestrained development that increases demand for already scarce groundwater, trespass cattle grazing, and global climate change (Leenhouts et al. 2006; Makings 2006, p. 20; Makings 2013, p. 75; Richter et al. 2009).

The Lewis Springs Ciénega is sustained by groundwater flows (Baillie et al. 2007, Meixner 2018) and receives its water from springs on the east side of the San Pedro River; water from the spring's outlet flows to the west and into the San Pedro River. Meixner (2018) finds that the source of the water at Lewis Springs derives

primarily from the deep aquifer as opposed to the shallow alluvial aquifer from the San Pedro River base flow. Meixner (2018) concludes that the Lewis Springs water derives from a mix of basin groundwater 20-47 percent from the west and 53-80 percent from the east. Dr. Meixner's study is based on the methods of Baillie et al. (2007).

Specifically, Meixner (2018) states:

Based on these SCR [sulfate to chloride ratio] values, Lewis Springs water is calculated as being 47% Huachuca Mountains groundwater and 53% Mule Mountains groundwater. If instead $\delta^{18}\text{O}$ values are used to calculate the mixture of water that composes Lewis Springs, the percentages are calculated as 33% Huachuca Mountains versus 66% Mule Mountains; and if δD is used the water is calculated as 20% Huachuca Mountain water versus 80% Mule Mountains water. While the range of potential influence from either the Huachuca Mountains or the Mule Mountains is wide for all tracers. The results support the conclusion that both sources of water, both east and west of the river are important sources of water to Lewis Springs, which is located on the east side of the river (p.1).

The basin aquifer west of the San Pedro River continues to be threatened by excessive local groundwater pumping from the Sierra Vista/Fort Huachuca population center. More groundwater is being pumped out of the aquifer than is being replenished (ADWR 2005; FWS 1997, 2007, 2014a, and 2014b; Gungle et al. 2017; Kennedy and Gungle 2010; Scott et al. 2005; USGS 2014).

FWS has acknowledged the fact that more groundwater is being pumped out of the groundwater aquifer in the Sierra Vista/Fort Huachuca area on multiple occasions. On January 6, 1997, in FWS' Final rule of the Determination of Endangered Status for Three Wetland Species Found in Southern Arizona and Northern Sonora, Mexico, FWS states:

The point of the Service's discussion in the proposed and final rules in regard to groundwater pumping in the Sierra Vista subwatershed is that withdrawal of water from the aquifer in excess of recharge threatens the baseflow of the upper San Pedro River and, in turn, threatens *Lilaeopsis* habitat... On page 46 of Dr. Maddock's testimony he states that if pumping continues "the cone of depression continues to expand. It actually turns the stream (the San Pedro River), which is in some cases perennial in the reaches, to intermittent." On pages 65 and 66 of the testimony he states that if pumping continues the San Pedro River may become like reaches of the Santa Cruz River that are now dry and devoid of riparian vegetation due to groundwater pumping. He goes on to say on page 84 of the testimony that during the period of his study, groundwater pumping in the Palominas area had reversed the flow of groundwater so that the groundwater was flowing to the cone of depression there, rather than into the San Pedro River, which directly reduced river flows...

ASL (1995) calculated that the cone of depression in the Sierra Vista/Fort Huachuca area in 1995 was in excess of 36.6 m (120 ft) deep with drawdown levels of more than 6.1 m (20 ft) extending from north of Huachuca City and the Babocomari River to well south of Highway 90, a distance of approximately 18 km (11 mi). Water and Environmental Systems Technology, Inc. (1994) estimated that even if all pumping stopped in the Sierra Vista/Fort Huachuca area, the cone of depression would continue to spread toward the river as it flattened out and river flows would continue to decline through the year 2088.

Groundwater modeling indicates that effects to upper San Pedro River baseflows may not occur for 25 years or more (ASL 1995), thus the Service concurs that groundwater pumping in the Sierra Vista/Fort Huachuca area does not pose an immediate threat to *Lilaeopsis*. However, adverse effects are likely to occur in the foreseeable future unless mitigating actions are implemented very soon. These measures could include water conservation, effluent recharge, watershed

improvements, stormwater recharge, and others, many of which are in the planning stages or are being implemented to some degree in the subwatershed. Modeling suggests that if effluent recharge and other measures are implemented, flows may actually increase in some reaches over the next 100 years (ASL 1995, Water and Environmental Systems Technology, Inc. 1994). However, in the long term, unless water withdrawals are brought into balance with recharge, growing cones of depression will eventually capture effluent recharge and river flows, and *Lilaeopsis* habitat in the San Pedro River will be lost....

...the cone of depression under Sierra Vista/Fort Huachuca continues to grow in all scenarios. The Service is concerned that as it grows, the cone will in time (perhaps more than 100 years) capture the effluent recharge and then the river itself, unless water recharge is balanced with use...

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range... Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, agriculture, mining, road building, nonnative species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population. Each threat is discussed in more detail below...

...continued unmitigated groundwater withdrawal threatens to reduce or eliminate baseflows in the San Pedro River (Arizona Department of Water Resources 1991, ASL 1995, Water and Environmental Systems Technology, Inc. 1994). A reduction in baseflow as a result of groundwater pumping in the Sierra Vista-Fort Huachuca area could occur within 25 years, but such effects could be reduced by water conservation, watershed management, effluent recharge or other measures to reduce water use or increase recharge (ASL 1995, Water and Environmental Systems Technology, Inc. 1994).

Such measures are being developed and implemented, including development of a Surface Water Plan and Effluent Recharge Plan, and adoption of water conservation measures by the City of Sierra Vista; and implementation of water conservation measures, enhancement of mountain front recharge, effluent recharge, and other actions by Fort Huachuca (ASL 1995, Fort Huachuca 1995). However, these measures may not be adequate to balance use with recharge, halt the eventual interception of the river by cones of depression, and ultimately, maintain baseflow throughout the upper San Pedro River (Water and Environmental Systems Technology, Inc. 1994, ASL 1995). If baseflow in the river decreases, a desertification of the riparian flora will occur (Stromberg *et al.* 1996). If the groundwater drops below the elevation of the channel bed, the wetland plant (herb) association where *Lilaeopsis* is found will be the first plant association to be lost (Arizona Department of Water Resources 1994, Stromberg *et al.* 1996)" (FWS 1997).

The Service's June 14, 2007, Biological Opinion regarding the ongoing and future military operations and activities at Fort Huachuca concludes:

The greatest threat to umbel habitat on the San Pedro River is continued ground water pumping in excess of recharge, which has the potential to lower ground water elevation under portions of the river, eliminate base flows, and result in desiccation of the riparian and wetland vegetation communities (BLM 1998, Stromberg *et al.* 1996, ADWR 1994.) The hydrology of the upper San Pedro River basin and associated topics has been studied by numerous investigators, particularly in the last decade (as discussed previously in this section). Much of the recent work has been driven by concerns that ground water pumping in the Sierra Vista Subwatershed may result in declining ground water elevations and loss of baseflow and riparian values along the San Pedro River...

The Service's March 31, 2014, Biological Opinion regarding Ongoing and Future Military Operations and Activities at Fort Huachuca also concludes:

Declines in water levels beneath long-term pumping centers in the Subwatershed have been measured over decades and indicate a general trend of reduction in aquifer level (Pool and Coes 1999). Rates of water-level declines have been largest in the Sierra Vista-Fort Huachuca pumping center... (FWS 2014a).

Similarly, the July 8, 2014, Final rule for Threatened Status for the Northern Mexican Gartersnake and Narrow-Headed Gartersnake, states:

The arid southwestern United States is characterized by limited annual precipitation, which means limited annual recharge of groundwater aquifers; even modest changes in groundwater levels from groundwater pumping can affect above-ground stream flow as evidenced by depleted flows in the Santa Cruz, Verde, San Pedro, Blue, and lower Gila rivers as a result of regional groundwater demands (Stromberg *et al.* 1996, pp. 113, 124–128; Rinne *et al.* 1998, p. 9; Voeltz 2002, pp. 45–47, 69–71; Haney *et al.* 2009 p. 1)...

The cone of depression associated with regional groundwater pumping is expected to continue expanding its influence on surface flow in the San Pedro River over the next several decades, which is expected to further reduce surface flow in the river and negatively affect riparian vegetation (Stromberg *et al.* 1996, pp. 124–128)" (FWS 2014b).

The Upper San Pedro Partnership (USPP), a coalition of local water users, is the entity charged with controlling the watershed's water deficit. In 2003, USPP promised to "balance the local water budget by 2011" in order to secure a special environmental law exemption for Fort Huachuca from Senator John McCain to protect the base from downsizing in the 2005 Base Realignment and Closure Round.

The September 13, 2003, Sierra Vista Herald's "USPP's resolution called a 'bold step;' Group pledges to help balance water deficit" reports:

In the resolution, the group, which is a consortium of federal, state and local agencies, businesses and environmental groups, says its members will balance the area's water deficit by 2011... The object of the resolution is to ensure the fort has the support it needs to survive the next Base Realignment and Closure round.

Strain [Sierra Vista mayor pro tem Bob Strain], the chairman of the partnership's Advisory Commission, said that can only be done with a commitment by the off-post communities to be part of the water use solution.

USPP reiterated its promise in its 2005 through 2011 reports:

...the Secretary of the Interior shall prepare, in consultation with the Secretary of Agriculture and the Secretary of Defense and in cooperation with the other members of the Partnership, a report on water use management and conservation measures that have been implemented and are needed to restore and maintain the sustainable yield of the regional aquifer by and after September 30, 2011 (USPP 2005, 2006, 2007, 2011, 2012, 2013, and 2014).

But the Upper San Pedro Partnership has failed to keep its promise to "balance the local water budget by 2011." In their 2012 report (USPP 2014), USPP admits:

...the Partnership has fallen short of the goal set by Congress to achieve sustainable yield (defined by the Partnership as erasing the water budget deficit) by September 30, 2011.

In their last report (2014), the aquifer overdraft total was minus 5,100 acre-feet per year (USPP 2014). This overdraft total does not include the additional 3,302.35 acre-feet per year of future use for the build out of the proposed 7,000 house, Pueblo del Sol Tribute development (ADWR 2012a; PDS 2012).

Local groundwater pumping greatly exceeds natural replenishment of the Basin aquifer. USGS (2014) confirms ADWR (2005) establishment that the yearly groundwater aquifer recharge from Huachuca mountain recharge is 15,000 acre-feet/year. However, even as of November 7, 2012, the Arizona Department of Water Resources (ADWR) had already issued pumping permits to developers for 18,071 acre-feet per year from the groundwater aquifer (ADWR 2012b), and 4,680 acre-feet per year for “exempt” or individual wells (USGS 2014) for a total of 22,751 acre-feet per year from the local groundwater aquifer that is replenished with only 15,000 acre-feet per year (USGS 2014).

In addition, since these overdraft numbers are from 2012, they do not include the fact that ADWR continues to issue permits for new wells (ADWR 2018) without regard for increasing the overdraft and while continuing to deny that they even need to “consider” the San Pedro River and SPRNCA springs when issuing permits for wells hydrologically connected to the San Pedro River and SPRNCA springs (Silver v. PDS). From January 1, 2012 through March 13, 2018, ADWR has issued an additional 306 new well permits in the Sierra Vista Subbasin of the Upper San Pedro Basin (ADWR 2018).

In June 2011, because of the uncontrolled, excessive, local groundwater pumping, hydrologist Dr. Laurel Lacher’s modeling concluded “much” of the aquifer-sourced San Pedro River base flow, or stream flow during the dry times of the year “will cease...over the next century.” Dr. Lacher’s exact quotation (2011) states:

In general, the simulations predict that, in the absence of any major water use changes in the basin, much of the San Pedro and Babocomari rivers will cease to have perennial baseflow over the next century due to the widespread impacts of projected groundwater pumping.

Lacher has since updated this 2011 study and in February 2018, Lacher’s conclusion is essentially the same:

The capture analysis in this study demonstrates that simulated natural recharge and existing MAR are insufficient to meet the net pumping demand in the model area, even at the reduced pumping rates in this study compared with the 2011 model update by Lacher (Lacher 2018).

In February 2017, Gungle et al. noted:

Nonetheless, it should be obvious that a subwatershed perennially in deficit will likely never see an increase in natural groundwater discharge to the river...Even if groundwater pumping were to stop today and the groundwater budget balance was positive for decades to come, the effects of pumping over the past century would eventually capture surface flow from the river (Leake and others, 2005; Barlow and Leake, 2012). According to recent modeling, some capture of surface flow from the San Pedro River is already occurring (Lacher and others, 2014)...

Base flow has been declining at the Palominas, Charleston, Tombstone, and Lower Babocomari gaging stations over the entire period of record...groundwater flow modeling, which can isolate the effects of groundwater pumping, has shown that water levels in the subwatershed have declined since 1902, reducing the groundwater gradients that influence groundwater flow toward the river by as much as 17 percent (Lacher and others, 2014). Water-level declines also reduce the total volume of water that flows to the river...

The expanding cone of depression (as expressed by the declining horizontal hydraulic gradients and decreasing water levels on Fort Huachuca) should be of interest to water managers and to those with an interest in the SPRNCA. Even if pumping were immediately reduced or stopped, the cone would continue to propagate for decades or more (Leake and others, 2005; Barlow and Leake,

2012). Without significant mitigation measures, it is likely too late already to prevent declining water levels from reaching the San Pedro River riparian area from Charleston to Tombstone.

USPP, in response to its failed promise to “balance the area's water deficit by 2011” has given up on balancing the Basin’s water deficit. USPP no longer even includes a deadline for balancing the area’s water deficit in its mission statement on its website (USPP 2018). USPP now rarely even meets.

In place of USPP, the City of Sierra Vista, Cochise County, the Arizona State Land Department’s Hereford Natural Resources Conservation District, the Nature Conservancy, and the City of Bisbee have created a new entity called the Cochise Conservation and Recharge Network (CCRN 2016). CCRN’s expressed purpose is:

...preserving the base flows of the San Pedro River and ensuring the long-term economic viability of local communities by promoting and implementing recharge and conservation efforts.

Instead of USPP’s promise to “balance the area's water deficit by 2011,” we now have the same local entities focused on “preserving the base flows of the San Pedro River” (CCRN 2016), indicating that the local groundwater pumping deficit and the aquifer overdraft are no longer priority.

The expanding cone of depression resulting from the effects of the ongoing groundwater pumping deficit and overdrafting of the aquifer will continue growing and will still ultimately capture and consume the surface water of the San Pedro River and SPRNCA’s seeps, springs and cienegas, including Lewis Springs.

Importantly, USPP’s and CCRNs’ temporary system of effluent recharge and stormwater recharge will not be helpful in preserving Arizona eryngo, since Lewis Springs is supplied by basin aquifer water instead of streamflow and alluvial aquifer water. Long term, Lewis Springs will be captured and sucked dry just like the rest of the threatened San Pedro River riparian area and the reclaimed effluent recharging area (FWS 2014b, Gungle et al. 2017, Lacher 2011, 2018).

Lewis Springs is also threatened by illegal trespass cattle that have been observed and continue to be observed in the wetlands on multiple occasions (BLM 2006; CBD 1997; CBD 2005; CBD 2016; CBD 2018; Stromberg et al 2018).

The only other extant population of Arizona eryngo in the United States is at La Cebadilla Ciénega near Tucson. The La Cebadilla Property is an undeveloped parcel that was acquired by the Pima County Flood Control District to protect the adjacent Tanque Verde Creek from ongoing channel disturbance. The spring that feeds the wetlands at La Cebadilla is located on private property north of the site. The hydrology of the feeder spring property and of La Cebadilla has been altered as evidenced by constructed berms and ditches throughout both properties (SWCA 2002, p. 3). The flows that support the ciénega at La Cebadilla are diverted to support a pond. Maintaining both the ciénega and the pond may require trade-offs during dry years as regional groundwater levels decline (Stevens 2012, p. 4). The open wet meadow habitat is also threatened by the encroachment of shrubs (Stevens 2012, p. 4).

Populations of Arizona eryngo in Mexico are also threatened by habitat loss and degradation. Some reported populations from Mexico have likely been misidentified and the species may actually only occur in Chihuahua and Sonora. A site visit in 2017 to Ojos de Arrey, a once-large spring complex in the Rio Santa Maria drainage south of Galeana where it was thought Arizona eryngo could potentially occur, found that the condition of the wetland was one of total deterioration, apparently caused by over-exploitation of the aquifer (Sanchez Escalante Personal Communication 2018).

Arizona eryngo is threatened by the destruction, modification, and curtailment of its habitat and range and thus warrants Endangered Species Act protection.

Overutilization

Overutilization is not currently a threat to *E. sparganophyllum*.

Disease and Predation

Disease and predation are not known to impact *E. sparganophyllum* at this time.

Other Factors Affecting Its Continued Existence

Climate Change

Anthropogenic climate change is having a significant impact on physical and biological systems globally (Rosenzweig et al. 2008, p. 353). Climate change impacts have now been documented across every ecosystem on Earth (Scheffers et al. 2016, p. 719). The future global extinction risk from climate change is predicted not only to increase but to accelerate as global temperatures rise (Urban 2015, p. 571).

The American Southwest is getting hotter and drier (Vose et al. 2017, pp. 186-190; Easterling et al. 2017, pp. 207-209). Climate models project that precipitation and soil moisture in the Southwest will continue to decrease (Easterling et al. 2017, p. 217; Wehner et al. 2017, pp. 231, 238).

Global warming driven by rising greenhouse-gas concentrations is expected to cause a steady drop in precipitation over the American southwest by 2040 leading to declines in surface water availability (Seager et al. 2013, p. 482).

Arizona has already become both hotter and drier (NOAA 2018). From 2013 through 2018 the level of precipitation in Tucson was more than five inches below the 100-year average, the maximum temperature was 2.2 degrees Fahrenheit above the 100-year average, and the average temperature in Tucson was 2.5 degrees Fahrenheit above the 100-year average (NOAA 2018).

Increasing temperature and decreasing precipitation will lead to declines in surface and groundwater levels, directly threatening the future of the ciénegas on which Arizona eryngo depends for survival. Regional population growth and an ever increasing demand for freshwater will exacerbate already existing pressure on water supplies and groundwater levels, further threatening the plant's future.

Inadequacy of Existing Regulatory Mechanisms

There are no existing regulatory mechanisms that adequately protect Arizona eryngo.

There are two known surviving populations in the United States.

The population at La Cebadilla near Tucson is on land owned by the Pima County Flood Control District, but the spring that feeds the wetland is on private property north of the county property. The population needs protection to ensure that management is conducted in a manner that facilitates the plant's survival. Currently, water is diverted to maintain a pond, and the encroachment of shrubs is also a concern. Arizona eryngo needs ESA protection to make sure that the plant's survival is taken into consideration by the county when making

management decisions for the property. The management of the spring that feeds the property also occurs in the absence of regulatory mechanisms that would conserve the rare species.

The second U.S. population of Arizona eryngo is found in the San Pedro Riparian National Conservation Area (SPRNCA), which was created in 1988 and is managed by the U.S. Bureau of Land Management (BLM). Though the habitat is protected in theory because it is federally managed, the Lewis Springs Cienega faces several threats that are not being adequately addressed by existing regulatory mechanisms, leaving the plant at high risk of extirpation at the site. Though livestock grazing is technically prohibited, trespass cattle are commonly found in the SPRNCA and enforcement is lacking.

The Center for Biological Diversity (CBD), as well as others, has a long record of documenting the presence of trespass cattle within SPRNCA. (For example: BLM 2006; CBD 1997; CBD 2005; CBD 2016; CBD 2018; Stromberg et al. 2018) In turn, BLM has a long record to date of non-action in removing the trespass cattle (Ibid.)

The BLM's SPRNCA management continues to be plagued by BLM's refusal to and inability to remove trespass cows from the SPRNCA. Consequently, very little new cottonwood/willow habitat has been able to re-establish for an extended period of time since the initial recovery of the early 1990's. Our members, as well as volunteers with the 2017 Nature Conservancy wet/dry survey, continue to observe trespass cows throughout the SPRNCA.

Lewis Springs is also under dire threat from groundwater decline. Addressing the driving forces causing groundwater loss in the San Pedro region presents significant challenges for land managers (Makings 2005, p. 92). Though the legislation that designated the area directs the BLM to manage the site in a manner that conserves, protects, and enhances the riparian area and resources, the integrity of the site is threatened by diminishing groundwater and increasing demands on water resources. There are no mechanisms in place to regulate the demands on the regional aquifer in a manner that will sustain the hydrology that supports the maintenance of the cienega habitat on which Arizona eryngo depends for survival.

Ongoing residential and other development in the San Pedro Valley is a major threat to the future conservation of a flowing San Pedro River and high water table supportive of riparian vegetation. No mitigated growth standards exist.

There are no regulatory mechanisms in place in Mexico to protect *E. sparganophyllum*.

Without Endangered Species Act protection, this endemic plant is at risk of extinction in the foreseeable future.

CONCLUSION

Arizona eryngo is a rare and highly threatened species that is dependent on fragile and at-risk wetland environments. At least two populations in the United States are known to have been extirpated, leaving only two U.S. populations and only one to two populations in Mexico. The plant qualifies for Endangered Species Act protection because it is threatened by modification or curtailment of habitat or range due to wetland destruction and declining groundwater levels, and by grazing and global climate change. There are no existing regulatory mechanisms to prevent the plant's extinction. We urge the Service to propose the plant for listing and to designate critical habitat to ensure that it survives for future generations.

REQUEST FOR CRITICAL HABITAT DESIGNATION

Petitioners urge the Service to designate critical habitat for Arizona eryngo concurrently with listing. 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 insuring 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).

Critical habitat is an effective and important component of the ESA, without which the Arizona eryngo's long-term chance for survival diminishes. Petitioners thus request that the Service propose critical habitat for this rare plant concurrently with its proposed listing.

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Appendix: Notice to Arizona in accordance with the September 27, 2016 Final Rule on Revisions to Regulations for Petitions (81 FR 66462)

February 1, 2017

To: Larry D. Voyles, Director
Arizona Game and Fish Department
Main Office - Phoenix
5000 W. Carefree Highway
Phoenix, AZ 85086-5000
lvoyles@azgfd.gov

Alexa Sandoval, Director
New Mexico Department of Game and Fish
1 Wildlife Way
Santa Fe, NM 87507
alexandra.sandoval@state.nm.us

CC: U.S. Fish and Wildlife Service
Benjamin_Tuggle@fws.gov
Gary_Frazer@fws.gov

Dear Arizona Game and Fish Department and New Mexico Department of Game and Fish:

Pursuant to 50 C.F.R. § 424.14(b), we hereby provide notice that the Center for Biological Diversity intends to file a petition under the federal Endangered Species Act to list and designate critical habitat for a rare and imperiled plant, the Arizona eryngo (*Eryngium sparganophyllum*) no sooner than 30 days from the date that this notice is provided.

Please feel free to contact me for more information.

Sincerely,



Tierra Curry
Senior Scientist
PO Box 11374
Portland, OR 97211
928-522-3681
tcurry@biologicaldiversity.org

Tierra Curry

From: Tierra Curry <tcurry@biologicaldiversity.org>
Sent: Wednesday, February 01, 2017 2:52 PM
To: lvoyles@azgfd.gov; alexandra.sandoval@state.nm.us; Gary_Frazer@fws.gov; benjamin_tuggle@fws.gov
Cc: tcurry@biologicaldiversity.org; 'Robin Silver'
Subject: Notice of Petition for Eryngium sparganophyllum

Dear Arizona Game and Fish Department and New Mexico Department of Game and Fish:

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Please feel free to contact me for more information.

Sincerely,

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Tierra Curry
Senior Scientist
Center for Biological Diversity
PO Box 11374
Portland, OR 97211
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At the Center for Biological Diversity, we believe that the welfare of human beings is deeply linked to nature — to the existence in our world of a vast diversity of wild animals and plants. Because diversity has intrinsic value, and because its loss impoverishes society, we work to secure a future for all species, great and small, hovering on the brink of extinction. We do so through science, law and creative media, with a focus on protecting the lands, waters and climate that species need to survive. We want those who come after us to inherit a world where the wild is still alive.