BEFORE THE SECRETARY OF THE INTERIOR

PETITION TO LIST THE LAS VEGAS BEARPOPPY (*Arctomecon californica*) UNDER THE ENDANGERED SPECIES ACT AND CONCURRENTLY DESIGNATE CRITICAL HABITAT

Las Vegas bearpoppy (*Arctomecon californica*) visited by the Mojave poppy bee (*Perdita meconis*) Photo by: Zachary Portman

CENTER FOR BIOLOGICAL DIVERSITY

August 14, 2019

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, 5 U.S.C. § 553(e); 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," "Service"), to protect the Las Vegas bearpoppy (*Arctomecon californica*) as endangered 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.

Petitioner also requests that critical habitat be designated for the Las Vegas bearpoppy concurrently with the species being listed, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

Petitioner 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 1.6 million members and online activists throughout 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 Las Vegas bearpoppy and its habitat.

Submitted this 14th day of August, 2019

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Executive Summary

Arctomecon californica, the Las Vegas bearpoppy, was once found on over 40,000 acres in the Mojave Desert of Nevada and northern Arizona. The Las Vegas bearpoppy is an integral part of the Mojave Desert floral ecosystem with a characteristic yellow bloom that provides pollen for native bees. Without this charismatic plant, the Mojave Desert is at risk of losing a species that defines its very essence. Unfortunately, the once prolific desert poppy's existence is imperiled, it has been reduced to a mere estimated 10-13 remaining areas. The bearpoppy is imperiled by habitat loss and fragmentation due to urbanization, grazing, non-native honey bees that compete with specialist pollinators and degrade the plant community, motorized recreational activities, gypsum mining, climate change, lack of genetic diversity, and lack of protective regulatory mechanisms. In addition to ongoing threats, the poppy faces new and looming threats, including approved expansion of mining that will destroy some of the little remaining bearpoppy habitat on public land and a range of impacts stemming from existing in one of the highest human population growth rates in the United States.

The Las Vegas bearpoppy is listed as a Nevada state critically endangered species and is covered under the Clark County Multiple Species Habitat Conservation Plan (MSHCP). The Las Vegas bearpoppy was included in the MSHCP in order to prevent it from declining to the point where it would need to be listed as a federally endangered species. Unfortunately, these designations have not and do not adequately protect the species, as the bearpoppy has declined precipitously in both extent and abundance throughout its range and continues to be imperiled throughout Clark County. In addition, recent proposals to weaken the MSCHP include allowing for expanded urban development on 250,000 acres or more, including bearpoppy habitat, reducing the covered species, and increases in the disturbance acreage permitted under the take permit. The MSHCP and other regulatory mechanisms have failed. The Service must act to protect the Las Vegas bearpoppy under the Endangered Species Act in order to prevent the extinction of the species and its important pollination mutualisms that shape the iconic Mojave Desert.

Introduction

The Las Vegas bearpoppy was first described by Captain John Charles Fremont in 1843 as a "remarkable plant" and was found in only one place where the soil was "sterile and gravely"(Torrey & Fremont 1845 p. 311). With its distinctive 'bear-paw' leaves and vibrant yellow flowers it is unmistakable in the otherwise stark desert environment. This species is remarkable not only for its floral display, but also because it is one of only a few species that thrives in gypsic soils with cryptogamic crust where the soil chemistry and surface structure prevent many other species from establishing. The Las Vegas bearpoppy aids in soil retention, provides pollen and nectar for insects, and, as a member of the poppy family, may be medicinal, as it contains a diverse range of alkaloids (Raynie et al. 1991 p. 403).

Despites its beauty, as well as its utilitarian and intrinsic value, the Las Vegas bearpoppy has lost a significant portion of its range, largely due to urban development, an ongoing threat. The Las Vegas metro region is one of the fastest growing areas in the United States, growth that has resulted in increasingly less bearpoppy habitat. Clark County instituted the Multiple Species Habitat Conservation

Plan (MSHCP) in 2001 in order to mitigate the increase in development of unincorporated parts of the county and overcome "onerous" environmental compliance with Endangered Species Act for listed species such as the desert tortoise (Center for Business and Economic Research 2018 p. 7). Since the inception of the MSHCP, Clark County has developed 96,000 acres and is set to continue development as the human population grows (Center for Business and Economic Research 2018 p. 15).

The Las Vegas bearpoppy is a covered species under the MSHCP, but has continued to see declines in population range and abundance; furthermore, of the remaining Mojave desert scrub habitat, 43% lies in private or BLM land slated for multiple uses (Clark County Department of Comprehensive Planning 2000a pp. 123–124), many that threaten the continued existence of the Las Vegas bearpoppy. Thus, the Las Vegas bearpoppy is threatened throughout its range by urbanization, mining, habitat degradation, loss of specialist pollinators, climate change, off-road recreation, invasive species, and grazing and subsequent pesticide use, and, as a result, is in danger of extinction without protection under the Endangered Species Act.

Natural History

Description

The Las Vegas bearpoppy, *Arctomecon californica,* is a perennial forb that is specially adapted to the gypsic soils of the northeastern Mojave Desert (Nevada Natural Heritage Program 2001 p. 1). The bearpoppy forms first year rosettes of wedge-shaped, hairy, and grayish-blue leaves with characteristic three to five teeth on the tips of the leaves. The flowers of the Las Vegas bearpoppy are bright yellow with usually six petals on a stalk up to 26 inches tall (Nevada Natural Heritage Program 2001 p. 1). The bearpoppy may produce flowers from March to May in its second or subsequent years given sufficient rainfall; the bearpoppy requires insect mediated pollination for successful reproduction (Thompson & Smith 1997 p. 153; Nevada Natural Heritage Program 2001 p. 1). The bearpoppy's fruit is an egg shaped capsule up to one inch long with six ribs and an opening at the top that produces at least 100 (up to 160) shiny black seeds (Megill & Walker 2006 p. 6).

Taxonomy

The Las Vegas bearpoppy is one of the few species that was collected and described by Captain John Charles Fremont during his expedition in the American west in 1843 (Torrey & Fremont 1845 p. 312). The Las Vegas bearpoppy is a member of Papaveracae (poppy family) and was the first member of the genus *Arctomecon*. The name is derived from Greek arktos – "bear" – and mekon – "poppy" – because of the hairy leaves resemblance to a bear's paw (Nelson & Welsh 1993 p. 198). Fremont gave it the species designation *californica* from the name of the region Alta California which was part of Mexico at the time (Nelson & Welsh 1993 p. 198). Currently, *Arctomecon californica* meets the standards for species designation (Integrated Taxonomic Information System 2019).

The genus *Arctomecon* differs significantly from other members of the poppy family in the Mojave Desert such as *Argemone spp*. and *Platystemon spp.* The Las Vegas bearpoppy is the only member of the poppy family that is restricted only to gypsum soil outcroppings (Nelson & Welsh 1993 p. 199). Geographic isolation and restricted habitat characteristics have separated this genus into three

distinct species. The other two species in the *Arctomecon* genus – *humilis* and *merriamii* – differ from *A. california* with respect to several morphological characteristics including: flower color, number or petals, apical leaf margin, and overall stature (Nelson and Welsh 1993 p. 199).

Habitat

The Las Vegas bearpoppy is a xeric-adapted poppy species that is often found in gypsum outcroppings in the western Mojave Desert. This native poppy has been found on just over a maximum range of 60.7 square miles or nearly 40,000 acres in Nevada (with additional small populations in Arizona) and at an elevation between 300 ft and 1100 ft (Nevada Natural Heritage Program 2001 p. 1). The Las Vegas bearpoppy occupies areas of sparse vegetative cover (Megill et al. 2011 p. 200) with rocky, low bulk density soils (Saxena 2005 pp. 34, 40) and often in areas with high gypsum content (Meyer 1986 p. 1309; Drohan & Merkler 2009 p. 102), although it has sometimes been found in soils with very little sulfate (Drohan and Merkler 2009 p. 103-104). Las Vegas bearpoppy habitat has most often been characterized by plant community associations; the bearpoppy is found alongside shrubs bur-sage and creosote bush as well as other perennial forbs (Thompson & Smith 1997 p. 158). The Las Vegas bear poppy is also associated with cover of cryptogamic crusts (Mistretta et al. 1996 p. 9). Cryptogamic crusts consist of flat or low-growing lichen, moss, and cyanobacteria that, when left undisturbed, prevent erosion and increase nitrogen availability in the soil (Harper & Van Buren 2004 pp. 482–483). The Las Vegas bear poppy is likely specially adapted to germinate and grow in the presence of these crusts when other plants cannot (Megill et al. 2011 p. 203; Bailey 2019 p. 1).

Population Structure

Thompson and Smith (1997) conducted the largest population level study as of 1997 of the Las Vegas bearpoppy which provided evidence for population structure and dynamics. Populations of the Las Vegas bearpoppy have been observed to be highly variable with low survivorship among seedlings (Thompson and Smith 1997 p. 155). Seedling mortality ranges from 60-87% but mortality decreases to between 5-25% in older (2+ year old) plants (Thompson and Smith 1997 p. 155). Population size for the Las Vegas bearpoppy is also seasonally variable showing growth and recruitment in the spring or during periods of rain suggesting episodic population growth and mortality (Thompson and Smith 1997 p. 163).

It is hypothesized that the Las Vegas bearpoppy has a long lasting seed bank that helps the species hedge against unfavorable weather. A study of the bearpoppy seed bank found a density of 0.651 viable seeds per m^2 and overall 60% of the seeds were found in the top two cm of soil with 40% at 2-4 cm in depth (Megill et al. 2011 p. 198). Seeds are primarily dispersed by ants and to a lesser extent by rodents in a clumped manner (Megill 2007 pp. 24–25). Seed dispersal for the Las Vegas bearpoppy is spatially sporadic, so it is important that undeveloped habitats with suitable soil and vegetative conditions be conserved in order for recovery of the Las Vegas bearpoppy (Megill et al. 2011 p. 204).

Pollination

Pollination and seed production are important factors for effective conservation. The flowers of the Las Vegas bearpoppy require outcrossing mediated by insect pollinators in order to produce full seed-set; they produce significantly more seeds when pollinated by outcrossing and produced few seeds when self-pollinated (Tepedino & Hickerson 1996 p. 8). Tepedino and Hickerson (1996 p.10) recorded 23

species of Hymenoptera (bees and wasps) visiting bearpoppy flowers. They found that the two most important floral visitors in the Lake Mead National Recreation Area were *Magandrena enceliae* and the poppy specialist *Perdita meconis* (Mojave poppy bee) (Tepedino and Hickerson 1996 p. 11).

There is abundant evidence for the effectiveness and importance of the Las Vegas bearpoppy's oligolectic specialist pollinator, the Mojave poppy bee, which is itself an endangered species awaiting federal protection (Cornelisse 2018 pp. 3–6). Female Mojave poppy bees collect pollen for 30 seconds to several minutes and are often seen landing on a poppy flower with pollen from another bearpoppy; pollination occurs when they contact the stigma (Hickerson 1998 pp. 35–36). Female Mojave poppy bees that have been tracked visited more than one plant while foraging (Tepedino et al. 2014 p. 318) while males wait and defend spots on flowers and copulate with females as they arrive to the flower (Tepedino et al. 2014 p. 319). Specifically, males move about the poppy flowers while waiting for females and will actively engage in aggressive behavior with other males, resulting in tumbling of the males throughout the flower with both of them collecting pollen and contacting the stigma (Portman et al. 2018a p. 10). The presence of a defending Mojave poppy bee male on a poppy flower causes other males as well as other bee species to move on to a different flower, promoting outcrossing and pollination efficiency (Portman et al. 2018a p. 10). Mojave poppy bee mating occurs in a flower, with the pair often contacting the stigma, before the female moves on to another flower (Hickerson 1998 p. 36), resulting in pollination of the bearpoppy.

Current and Historic Distribution

Las Vegas bearpoppies are restricted to Clark County, Nevada and potentially Mohave County, Arizona (WRA 2018 p. 150). The "Las Vegas bearpoppy" was known from only three sites in Arizona in 2007, but botanists familiar with the populations in both states have speculated that they may be separate species based on morphological and ecological differences (The Nature Conservancy 2007 pp. 47–48). The historic distribution of the bearpoppy in Clark County extended north of Lake Mead and between Gold Butte in the east and Las Vegas Valley in the west (The Nature Conservancy 2007 p. 48).

Surveys for the Las Vegas bearpoppy have been conducted sporadically since 1993 by the Bureau of Land Management (BLM) and the National Park Service (NPS) (The Nature Conservancy 2007 p. 52). The Las Vegas bearpoppy has been on the decline across its range since a documented population high in 1994, both in terms of abundance and number of populations (Megill & Walker 2006 p. 3), which is shown from various surveys throughout its range. Surveys from 1998 found the Las Vegas bearpoppy in 174 sites, but the trend of rapid decline was documented in 2000 with the plants at only 108 sites (a 38% decline in two years), 12% of which were deemed to be extirpated with another 16% at high risk of extirpation due to urbanization- 10 of those sites (9.3%) were extirpated two years later (The Nature Conservancy 2007 pp. 53–54). In a survey done by The Nature Conservancy contracted by the Nevada Division of Forestry in 2005, Las Vegas bearpoppy populations were found at only nine (24%) of 37 previously occupied sites surveyed (Klein 2005 pp. 6–9). More recent data show that the Las Vegas bearpoppy has declined in range down to 20-24,000 acres or over half its documented range since 1994 (The Nature Conservancy 2007 p. 55; Nevada Natural Heritage Program 2017 pp. 1–2).

In the latest survey reports from 2007 and 2018, 10 habitat areas of the Las Vegas bearpoppy were named in Nevada including in the Las Vegas Valley, Las Vegas Dunes, Sunrise Valley, White Basin,

Valley of Fire, Bitter Spring Valley, Gale Hills, Government Wash, Middle Point, and Gold Butte (The Nature Conservancy 2007 p. 48; WRA 2018 p. 150). The wide range indicated by these 10 population areas is misleading however, because the majority of the bearpoppies are concentrated, as of 2007, in only a few areas (Table 1). There is also a known population in Apex, Nevada. Nonetheless, the severity of decline is evident.

Table 1. Percent of the total Las Vegas bearpoppy population known in 2007 from each area, modified from The Nature Conservancy (2007 p. 61, the remaining < 0.10% occurs in Arizona). Poppy abundance summed from 1996 and 2007 for select sites on public land, derived from Bangle et al. (2010 p. 77).

Population Areas	**Percent of total population (based on survey points pre-2007)**	**Estimated number of plants in 1996**	**Estimated number of plants in 2007 (plants over 1000 are estimates)**
Sunrise Valley/Hills	53.29	6,300	1,200-2,200
Las Vegas Valley	13.09	n/a	n/a
Gold Butte	11.43	71,000	> 4,100
Bitter Springs Valley	8.53	15,000	100-2,000
Las Vegas Dunes	5.36	n/a	n/a
Gale Hills	4.25	10,000	> 2,000
Valley of Fire	2.36	3,000	100-1,000
Government Wash	0.37	300	0
White Basin	0.30	n/a	n/a
Middle Point	0.10	n/a	n/a

On public land, 44% of bearpoppy habitat is already lost (Bureau of Land Management 2018a p. 23). The BLM manages about half of the remaining bearpoppy habitat but despite the plant's state endangered status, the BLM's management of this land continues to imperil the species with mining authorizations, recreational and organized off-road vehicle races, and ignored illegal dumping, amongst other threats (Bureau of Land Management 2018a p. 23); the other half of the bearpoppy's public land habitat is found in the Lake Mead National Recreation Area (LMNRA) that is not without threats from recreation or grazing. Portman et al. (2018a p. 7) found few to no Las Vegas bearpoppies in recent surveys in LMNRA at the historic sites Overton Beach Road Junction, Echo Bay, and Calville Wash.

Las Vegas bearpoppy experts have indicated that 1,000 individual plants at a site qualifies that site as "fair" and a site with less as "poor," a site is only considered "good" with > 10,000 individuals and "very good" with > 100,000 individuals (The Nature Conservancy 2007 p. 55). Recent abundance surveys during Las Vegas bearpoppy monitoring for the MSHCP occurred in 2008-2009 in 28 occupied sites (Bangle et al. 2010 p. 12) and revealed that percent cover of the poppy decreased and very few seedlings were documented (Bangle et al. 2010 p. 22). Further, compared to numbers in 1996, 25 out of 28 surveyed populations had a reduction in bearpoppy individuals, in most cases by an order of magnitude or more, such as from 50,000 to 1,000 at Rainbow Gardens in Sunrise Valley on BLM land and 15,000 to 1,000 at sites in both Gold Butte on BLM land and in LMNRA (Bangle et al. 2010 p. 77). In the

Las Vegas Valley, bearpoppies are also in very low abundances in the urbanized, fragmented Las Vegas Valley (Hickerson 1998 pp. 33, 41; Portman et al. 2018a pp. 14–15).

The most recent data obtained from the BLM and the Nevada Natural Heritage Program were used to create a temporal distribution map for the Las Vegas bearpoppy from 1905 to the present (Bureau of Land Management 2018b; Nevada Natural Heritage Program 2018). The map (Figure 1) corroborates the findings in Table 1 that the vast majority of bearpoppies occurs at the urban interface in Sunrise Valley and fragmented in the Las Vegas Valley, areas where they are at imminent risk of extinction due to urbanization and mining. The data also corroborate the surveys, showing substantially fewer occurrences in recent years (Figure 1). Throughout its entire remaining range, the Las Vegas bearpoppy is endangered due to many threats outlined in this petition.

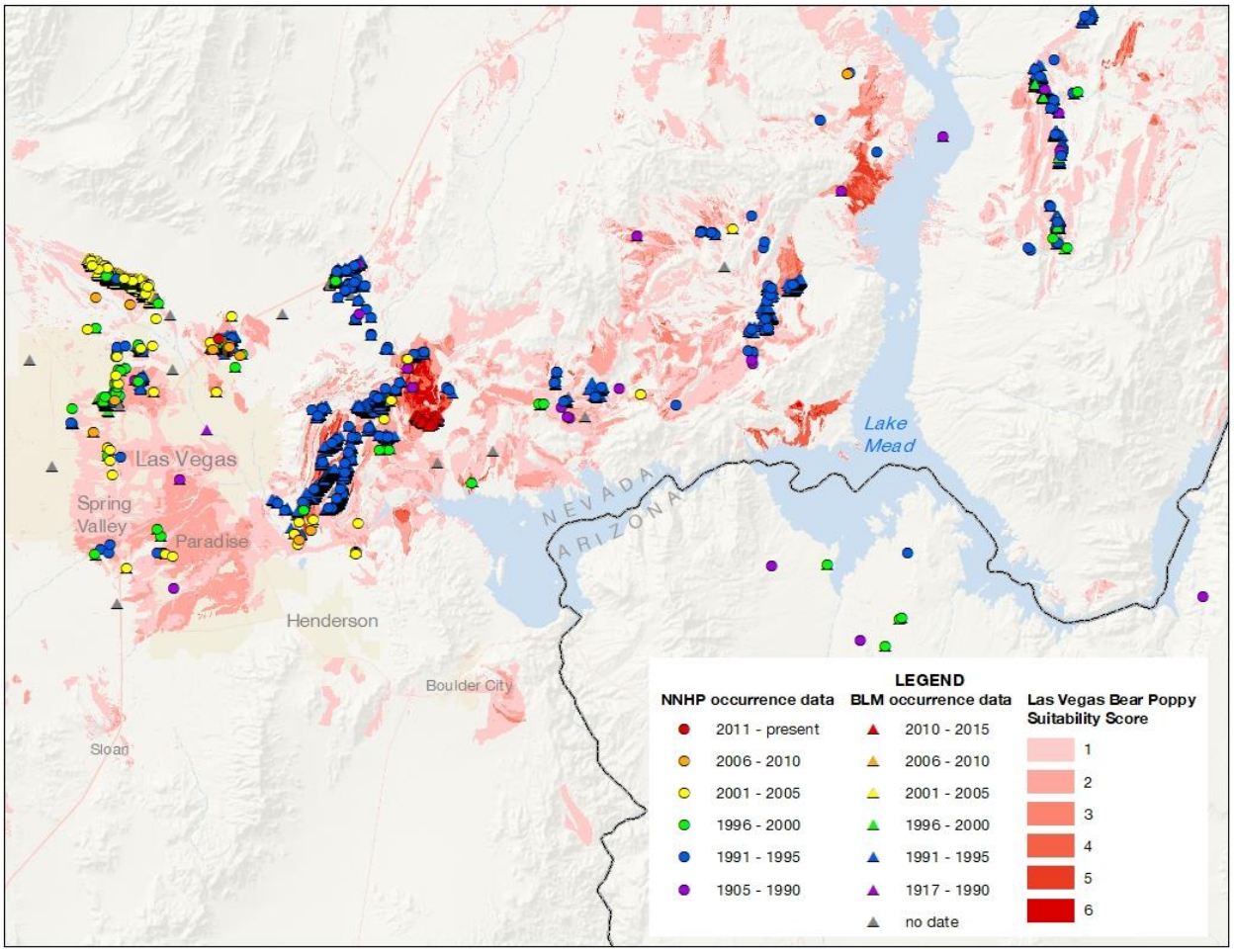

Figure 1. Map of Las Vegas bearpoppy occurrences documented by both the Nevada Natural Heritage Program (NNHP, circles) and the Bureau of Land Management (BLM, triangles) every five years pre-1990 until present or 2015, respectively, over a gradient of habitat suitability for the Las Vegas bearpoppy, with the darker red and higher number indicating increasing suitability.

Conservation Status and Warranted ESA Protection

The ESA is a "comprehensive scheme with the 'broad purpose' of protecting endangered and threatened species." Ctr. for Biological Diversity v. U.S. Bureau of Land Mgmt., 698 F.3d 1101, 1106 (9th Cir. 2012) (quoting Babbitt v. Sweet Home, 515 U.S. 687, 698 (1995)). Congress' plain intent in enacting the ESA was "to halt and reverse the trend toward species extinction." Tenn. Valley Auth. v. Hill, 437 U.S. 153, 184 (1978). In doing so, the ESA requires that "all Federal departments and agencies *shall* seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of [these] purposes." 16 U.S.C. § 1531(c)(1) (2012). Endangered and threatened species are "afforded the highest of priorities." Tenn. Valley Auth., 437 U.S. at 174. Endangered species are species that are "in danger of extinction throughout all or a significant portion of its range," and threatened species, species that are "likely to become endangered species within the foreseeable future" and are listed for protection pursuant to section 4 of the ESA. 16 U.S.C. § 1532(6), 1532(20), 1533.

The Las Vegas bearpoppy has been recognized as vulnerable or needing protection by international, state and local entities. It has a NatureServe ranking of G3/ Global vulnerable and S3/State Vulnerable (Nevada) from 1999 (NatureServe 2019 p. 1). It is a BLM Nevada sensitive species, and is listed as a covered species under the Clark County MSHCP. The Las Vegas bearpoppy is listed as critically endangered in the state of Nevada (Clark County Department of Comprehensive Planning 2000b p. 212) and an Arizona state listed species (Arizona Game and Fish Department 2016 p. 15). Despite its clear recognition as an endangered species by state and federal agencies, the Las Vegas bearpoppy face ongoing threats and lacks adequate protection from extinction.

The ESA defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range" and a threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Las Vegas bearpoppy meets the definition of endangered and was just last year considered a species needing further protection under the MSHCP (WRA 2018 p. 13). Thus, despite being included in the original Clark County MSHCP in 2002, the Las Vegas bearpoppy is still imperiled and only protection under the ESA will provide a possibility for its recovery.

The ESA 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)): 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 2) overutilization for commercial, recreational, scientific, or educational purposes; 3) disease or predation; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence. The Las Vegas bearpoppy's most significant known imperilment is caused by factors one, four, and five. While the plant itself is not overutilized for commercial, recreational, scientific, or educational purposes, its habitat is significantly overutilized for commercial and recreational purposes. Thus, the Las Vegas bearpoppy warrants protection as endangered under the Act. The best available science shows that the Las Vegas bearpoppy is in danger of extinction in a significant portion of its range, which has already declined significantly from its historical range. A prompt decision to move forward with listing the Las Vegas bearpoppy based on this petition is required to ensure that the plant does not go extinct.

Threats

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Urbanization

Urbanization has led to the current severely fragmented habitat and has resulted in the loss of vital population connectivity and habitat throughout Clark County, Nevada. This can be seen by the current declining range of the Las Vegas bearpoppy, populations of which were believed to occur on lands now developed for urbanization and gypsum mines (WRA 2018 p. 151). Urbanization has resulted in removal of the poppy and its seed bank as well as population declines and losses caused by habitat fragmentation, degradation, and disturbance. In addition, urbanization has resulted in a reduction of the Las Vegas bearpoppy's specialist pollinator, the Mojave poppy bee; urbanization generally results in a shift in the species community from solitary to social bees (Banaszak-Cibicka & Żmihorski 2012 p. 335; Cardoso & Gonçalves 2018 pp. 3–4) and to more generalist bees (Banaszak-Cibicka & Żmihorski 2012 p. 334; Hung et al. 2017 p. 8) that are less efficient pollinators (Dohzono & Yokoyama 2010 pp. 39–42; Aslan et al. 2016 pp. 479–480).

The majority of the Las Vegas bearpoppy's remaining habitat is located in Clark County, which had the second largest county population growth in the nation in 2017, adding 47,355 residents to its population of over 2.2 million (Brean 2018a p. 1). Much of Clark County's new growth is outside of Las Vegas at the urban-wildland interface in unincorporated areas of the County, which recently surpassed a combined population of 1,000,000 that continues to spill in to and destroy much of the remaining desert habitat (Davidson 2018 p. 1). The sprawl and development have been facilitated by Congressional land acts and the Southern Nevada Public Land Management Act, which provide for the disposal of BLM lands for private development. There is an extant population of bearpoppy in the Apex, Nevada, both on private and BLM land, which is threatened by industrial development including the direct loss and fragmentation of habitat. It is not unlikely that BLM lands in this area could also be targeted for further disposal in future public lands legislation, as the MSHCP disposal boundary is expanded outward.

Urbanization in Clark County has led to the construction of new roads and high road density at greater than 50% of bearpoppy habitat, which combined with soil erosion and compaction, lead to poor habitat quality (The Nature Conservancy 2007 p. 54-55). Development has so thoroughly consumed the bearpoppy habitat in the Las Vegas Valley that today the only remnant populations are on land adjacent to airports which have only been spared from grading and paving as a buffer for runways.

With growth projections of 2.8 million by 2050 (Center for Business and Economic Research 2018 p. 8), the Clark County Commission recently requested that Congress allow for the development of 44,000 acres of public land with a plan to further convert thousands of acres from conservation to development (Brean 2018b p. 1). The plan would also substantially modify the County's MHSCP and potentially allow for an additional 250,000 acres or more of urban development in the County, essentially doubling Clark County's built environment, without environmental review or Endangered Species Act consultation. This could, for instance, allow modification or destruction of the relict bearpoppy populations in the Las Vegas Valley and Apex area or other BLM disposal lands without even the minimal protections afforded the poppy by the extant MSHCP.

Habitat Loss and Fragmentation and Genetic Consequences

The distribution of Las Vegas bearpoppy populations suggests that there are potentially two remaining and fragmented regions (LMNRA region and Las Vegas Valley region) of a once larger and more widely distributed and connected population. The Las Vegas bearpoppy is threatened with habitat loss and fragmentation at the landscape scale and when habitat patches are broken up into a large number of patches with small average size, the population is at greater risk (The Nature Conservancy 2007 p. 55). Small populations are more vulnerable to local disturbances and are at greater risk of extinction from maladaptation and stochastic events (Ellstrand & Elam 1993 p. 237; Willi et al. 2006 p. 451; Leimu et al. 2010 p. 89). The fragmented bearpoppy populations have continued to decrease in size and become more isolated due to urbanization, expanding recreation, mining, and other threats which increase the risk of inbreeding and loss of vital genetic exchange from pollination out-crossing.

Because the bearpoppy relies on outcrossing for seed production, its reproduction is limited by the range and foraging habits of its animal pollinators. The small foraging distance of specialist pollinators can lead to failed reproduction in small or isolated populations of the poppies (Greenleaf et al. 2007 p. 589). Native pollinating bees become much less efficient at transferring pollen when host plants are too far apart, even at distances as small as 150 m (Peterson & Roitberg 2006 p. 592); the Mojave poppy bee has a typical foraging range of <10 m but a maximum of 300-400 m (Cornelisse 2018 p. 11). Pollination and seed set of the congener Dwarf bearpoppy, which shares specialist pollinators with the Las Vegas bearpoppy, decreased by over 40% when the poppies were locally fragmented (Harper et al. 2001 pp. 107–108). Specifically, when the density of poppies decreased in the landscape such that the plant or clusters of plants were > 10 m apart (compared to less than 3 m), pollination rate declined from 90% to 57% and seed set from 67% to 19% (Harper et al. 2001 pp. 107–108, Table 2). Our analysis of poppy observations suggests that the distance between present populated sites within the LMNRA are 13.6 km apart, on average, and are between 33-56 km apart at the BLM sites. Current distances between Las Vegas bearpoppy populations are insurmountable for small desert bees which results in reduced reproduction, loss of connectivity, and genetic isolation of Las Vegas bearpoppy populations, leading to greater risk of extinction.

Understanding and conserving genetic variation in the bearpoppy is very important to the future of this species. In 1998, poppies in the more fragmented Las Vegas Valley region had lower genetic variation than the LMNRA region (Hickerson & Wolf 1998 p. 31). While sheer genetic variation does not automatically confer fitness and survival, if there is evidence of lower heterozygosity due to increased inbreeding, swift action is necessary to increase gene flow and/or habitat connectivity for the bearpoppy and their pollinators (Booy et al. 2000 p. 384; Aavik et al. 2017 pp. 131–132).

A patch of bearpoppies should contain populations with between 10,000 and 100,000 individuals to be considered to be in “good” health (The Nature Conservancy 2007 p. 55). Without adequate genetic variation and gene flow among populations, the Las Vegas bearpoppy may be unable to adapt to rising rates of anthropogenic disturbance and climate change. Studies of rare endemic species such as the gypsumophile, *Centaurea hyssopifolia* (Amarguera), have shown that, despite high levels of genetic variation, the populations continue to decline because none of the variations produced traits that improved survivorship (Matesanz et al. 2017 p. 12). Monitoring for changes in long-term population size, degree of isolation, and fitness will provide essential information for the health of the Las Vegas bearpoppy. Conservation of remaining genetic variation is of great importance for the

bearpoppy and this can only be accomplished by protecting the species under the ESA to ensure landscape level, range-wide protections.

Mining

The Las Vegas bearpoppy host plant populations are highly threatened by gypsum mining (The Nature Conservancy 2007 p. 62). Gypsum mining is a threat to the Las Vegas bearpoppy in many ways: directly by killing bearpoppies, eliminating the seed bank, and destroying bearpoppy habitat by digging up the gypsum soil and indirectly through soil compaction, disturbance by vibrations from machinery, and the suspension of dust particles that reduce pollen availability, leading to reduced reproduction. There are active gypsum mines in Clark County, Nevada that mined over 2.7 million tons of gypsum in 2017 (Perry & Visher 2017 p. 21). The Lima Nevada Gypsum Mine and the Pabco Gypsum Mine are directly destroying bearpoppies and their habitat- despite both being in the Rainbow Gardens Area of Critical Environmental Concern (ACEC) (Bureau of Land Management 2018a p. 17).

The threat of gypsum mining on BLM land is a growing and imminent threat as the BLM approved an expansion of the Lima Nevada Gypsum Mine in May of 2018 (Bureau of Land Management 2018a, Finding of No Significant Impact and Decision Record) that is 15 miles east of Las Vegas and entirely within BLM land that houses Las Vegas bearpoppy populations (Johnson 2017 pp. 1–2). The newly approved mine expansion will impact 228.5 acres of gypsum habitat by creating open pit mines (Bureau of Land Management 2018a p. 4). The gypsum mining will destroy the rare gypsiferous soils and crusts that are endemic to the region and that provide habitat for the Las Vegas bearpoppy (Bureau of Land Management 2018a p. 17, 22). The Lima Nevada Gypsum Mine expansion will impact one of the largest and densest remaining populations of the Las Vegas bearpoppy (Bureau of Land Management 2018a p. 22): 150 acres of prime habitat- a unique gypsum plateau- will be permanently destroyed; this added to the 44% of bearpoppy habitat already lost (Bureau of Land Management 2018a p. 23).

The primary mitigation proposed by the Lima Nevada Gypsum Mine expansion is to remove soil and propagate bearpoppy seeds (Johnson 2017 p. Appendix F). However, attempts to grow the Las Vegas bearpoppy from seed or restore their habitat after disturbance to reestablish the plants in the magnitude required have not been successful (Bailey 2019 p. 1), by BLM's own admission (Bureau of Land Management 2018a p. 22). There is no reason to assume the mitigation would be any more successful than past failed attempts (Bureau of Land Management 2018a pp. 23–25). One proposed mitigation measure, allowing researchers to study how to restore crusts (Bureau of Land Management 2018a p. 18), is not real mitigation in that it does nothing to avoid, offset, minimize loss, or conserve these rare crusts that take many years to form, including upwards of 250 years to form or regenerate moss cover (Belnap 2016 p. 2).

Further, the mitigation allows for collection and storage of Las Vegas bearpoppy seeds "to use when better methodologies for germinating and growing these species becomes available in the future" (Bureau of Land Management 2018a p. 24); this in no way protects its declining specialist pollinator that exhibits a boom and bust bet-hedging life cycle in order to synchronize with the blooming of the host poppies (Smith et al. 2009 p. 34). On the BLM's own admission, "there would be long-term loss of 228.5 acres in the Rainbow Gardens ACEC" (Bureau of Land Management 2018a p. 25), further threatening the Las Vegas bearpoppy's viability and endangering the plant.

There is also further mining exploration occurring within occupied bearpoppy habitat in the White Basin area near Bittersprings. This activity is specifically targeting lithium deposits within the gypsiferous clay soils that the bearpoppy favors. The White Basin Exploration Project is being authorized by BLM as a "notice-level" project under the 1872 Mining Act. Notice-level projects are those which disturb less than five acres and thus are exempt from National Environmental Policy Act (NEPA) compliance and environmental review. As such, we are aware that this project is impacting occupied bear poppy habitat and individual bearpoppies and these activities pose an immediate threat to the plants. Documents copied from the project file at BLM and attached with this petition show the location of the bearpoppies (Bureau of Land Management 2019 pp. 1–2); the location of the proposed exploration activities (p. 3); an email from BLM to the project proponent describing having found bearpoppies at the project site (p. 4); and a photo showing bearpoppies near the drill sites (p. 5). There are no statutes or regulations protecting these plants against these exploration activities. In addition to the immediate threat posed by these exploration activities, they are indicative of a longer term threat of mineral development in the area. Development of gypsiferous soils for lithium mining could destroy significant occupied bearpoppy habitat and constitutes an ongoing and looming threat.

Grazing

Cattle grazing has contributed to the extirpation of the Las Vegas bearpoppy in Nevada and continues to threaten its little remaining habitat, as cows directly consume, kill, and reduce reproduction of the bearpoppies ("Bureau of Land Management Emails" 2018 pp. 1, 12–13, 24). Consumption, and therefore loss, of flower buds by grazing animals reduces reproduction of the bearpoppy (WRA 2018 p. 150). Although domestic animal grazing is legally prohibited in LMNRA, wild burro grazing in the Mojave Desert is concentrated in the Lake Mead area (Abella 2008 p. 810) and currently there is illegal cattle grazing on both National Park Service and Bureau of Land Management land (Bureau of Land Management 2014; Ellis & Martinez 2014 p. 1; Yachnin 2017 p. 1), threatening the Las Vegas bearpoppy in some of its last remaining populations in the Gold Butte National Monument (GBNM) and LMNRA areas.

The exact number of cattle being illegally grazed within bearpoppy habitat in GBNM and LMNRA is unknown at this time. During 2011-2012, the Bureau of Land Management used aerial surveys to document the trespass cattle in the area and found over 900, 729, 600, and 790 cows in four successive surveys (*United States v. Cliven Bundy* 2012). It is also known that the primary grazer in these areas, Cliven Bundy, sold more than 400 cattle between January 2016 and November 2017 (Yachnin 2017 p. 2); thus it appears his grazing operation is ongoing and it is likely there are several hundred cattle illegally grazing in GBNM and LMNRA. Given that there are no controls on where, when, or how the cattle are grazing, managers are not ameliorating the threat of illegal grazing to the Las Vegas bearpoppy.

In addition to direct mortality of bearpoppies, grazing causes soil disturbance and leads to use of pesticides. Grazing areas on federal public rangeland are sprayed with insecticides toxic to bearpoppy bee pollinators, such as carbaryl and malathion, to control grasshoppers (Tepedino 2000 p. 3). Soil surface stability is decreased and soil compaction increased by grazing (Kimoto et al. 2012 p. 7). Further, grazing disturbs and eliminates the important cryptogamic crusts that maintain soil stability and hold in essential moisture and nutrients (Mattoni et al. 1997 p. 112). These soil alterations degrade quality of Las Vegas bearpoppy habitat; according to The Nature Conservancy the soil surface should have >20% of

crust cover and have <10% of the habitat impacted by grazing trails to consider the area to be in "good" or "very good" condition (The Nature Conservancy 2007 p. 54).

Grazing further alters habitat by facilitating invasive plants that change the soil microhabitat and compete with the bearpoppies (Brooks 2009 pp. 105–106). Wild burros are generalist grazers and can spread nonnative seeds, such as Sahara mustard and *Bromus* spp. in LMNRA (Abella 2008 p. 813 and 817). Cattle feces and hay-feed increase organic matter and moisture in the soil, creating microhabitats that favor nonnative plants and allow them to outcompete native plants (Brooks 2009 p. 113). Watering sites for current or past livestock grazing found throughout the Mojave Desert serve as a source of and refuge for nonnative grasses that then spread during rainy periods (Brooks 2009 p. 113); this effect is further exacerbated by rapid urbanization in these areas leading to increased human water use, such as irrigated lawns (Portman et al. 2018b p. 603).

Treatment of invasive plants on public lands, including LMNRA, often involves herbicides (National Park Service 2010 p. 52). To control invasive plants, LMNRA uses many herbicides, including aerial spraying of glyphosate (National Park Service 2010 pp. 53, 115, 116). Broad spectrum herbicides are not species-specific and thus harm and kill Las Vegas bearpoppies (National Park Service 2010 p. 38). Use of herbicides can also harm bees, and thus the bearpoppy's specialist pollinators (Motta et al. 2018 p. 3).

Recreation

Nearly 7.9 million people visited LMNRA in 2017, up 10% from 2016, making it the sixth most visited National Park in the system (National Park Service 2018 pp. 1–2). The National Park Service attributes this partly to their "find your park" campaign and advertising of the "diverse recreational opportunities" at LMNRA (National Park Service 2018 p. 2). This increase in recreation threatens the Las Vegas bearpoppies in the national park (The Nature Conservancy 2007 p. 62) and outside of the LMNRA (Nevada Off-Highway Vehicle Commission 2018 p. 1), such as in the Rainbow Gardens ACEC (Trails Off Road 2018 p. 5). Many ground disturbing recreational activities, from horseback riding, driving, and biking can also be detrimental to rare plants but off-road vehicles use, which encompasses all-terrain vehicles (ATVs), such as quads and motorcycles, is the most common, far-reaching, and most detrimental recreational activity in Las Vegas bearpoppy habitat.

All of the remaining Las Vegas bearpoppy habitats on public land are threatened with off-road vehicle use (The Nature Conservancy 2007 p. 56) and damage from off-road vehicles has been observed in most of the known Las Vegas bearpoppy sites (Mistretta et al. 1996 p. 13). Off-road vehicle operators travel on designated routes but also frequently create new routes, including in areas that are supposed to be closed to such uses. Unfortunately, the bearpoppy's gypsum substrate weathers to form smooth, rock-free mounds that attract off-road vehicle users (Harper & Van Buren 2004 p. 482). Only 1-10 passes by an off-road vehicle leads to desert soil compaction and damage, resulting in water runoff and alteration of the soil biotic community (Lei 2009 p. 159). As a result, off-road vehicles easily destroy cryptogamic crusts on the soil surface. Cryptogamic crusts prevent erosion and increase nitrogen availability in gypsum soils (Harper & Van Buren 2004 pp. 482–483). As a result, off-road vehicles reduce the amount of nitrogen available in the soil and thus to the bearpoppies. Nitrogen is a key nutrient for plant growth as well as for attracting pollinators that require nitrogen-rich pollen for progeny development and population growth (Wiesenborn 2010 p. 5). Loss of cryptogamic crusts also reduces

water retention, additional nutrient retention, and seedling germination (The Nature Conservancy 2007 p. 52 and 58). Off-road vehicles disturb seed banks that regenerates bearpoppy populations in favorable years; without which they could completely disappear (Harper & Van Buren 2004 p. 488).

Off-road vehicles also create environmental pollution by expelling and kicking-up significant amounts of fine and coarse particulate matter (Goossens & Buck 2009 pp. 118, 134). Dust can cover the stigma and pollen of bearpoppies, reducing pollination and seed set (Harper & Van Buren 2004 p. 489). While there are no studies that look at off-road vehicle dust on plant-pollinator interactions, studies have shown that deposition of particles from volcanic ash decreased bee species richness and pollination (Morales et al. 2014 pp. 46–47) as well as visitation by pollinators to affected plants (Martínez et al. 2013 p. 271).

The combination of lost cryptogamic crusts, altered nitrogen and carbon dioxide, and ground disturbances by recreation and grazing alters the biotic community and favors invasive grasses, such as *Bromus spp.* (Smith et al. 2009 pp. 36–37). Tracks created by off-road vehicles, even single passes, can facilitate the spread of invasive plants by creating areas that trap and shelter seeds (Brooks 2009 pp. 112–113). Large increases in nonnative plant biomass and nonnative species richness has been found within off-road vehicle tracks and areas with increased off-road vehicle track density, respectively, in the Mojave Desert (Brooks 2009 p. 116).

It is well known that there are high levels of current off-road vehicle activity in the Rainbow Gardens ACEC, the Bitter Springs area, in the Lovell Wash area, and in the Nellis Dunes and Apex area, all of which harbor the bearpoppy. BLM is actively permitting off-road vehicle events within these areas (Bureau of Land Management 2016c, 2016b, 2016a, 2017). With the land management agency actively encouraging off-road vehicle use in these sensitive areas, and with the well-known phenomenon of riders going off-trail in areas with low vegetation like gypsiferous soils, off-road vehicle use within occupied bearpoppy habitat presents a significant and ongoing threat.

Invasive Species

The Mojave Desert is being invaded by several species including: *Bromus spp.* (invasive grass), *Schismus spp.* (invasive grass), *Malcomia africana* (African mustard), *Brassica tourneforntii* (Sahara mustard), and others. The combination of increased human presence, off-road vehicles, and climate change have created the conditions for the rapid spread of fast-growing grasses and other broadleaf weeds in the Mojave Desert. Invasive species now make up the majority of annual plant biomass and as much as 91% of biomass in dry years (Brooks & Berry 2006 p. 108). Introduced annual plant biomass correlates with proximity to urban areas and the number of fires in an area (Brooks and Berry 2006 p. 110). Climate change promotes species invasions in the desert southwest because it lengthens the number of frost-free days, changes the frequency of precipitation patterns, and increases fire potential (Abatzoglou & Kolden 2011 p. 475).

Invasive brome grasses (*Bromus spp*.) are fast-growing and enhance the risk of fire damage to sensitive desert ecosystems. Brome grasses set seed quickly in the spring and rapidly dry out creating tinder-boxes that can carry fires more effectively across a landscape because they accumulate in the areas between desert shrubs, like creosote bush, and spread the fire from shrub to shrub (Moloney et al. 2019 pp. 18–19). When fires become more severe and widespread, they risk destroying the plant populations in large areas of gypsum outcrop. Additionally, more extreme rainfall events associated with

climate change can cause the accumulation of this exotic biomass (Moloney et al 2019 p. 18-19) and at elevated CO_2 levels these grasses produce as much as 2.3 times above-ground biomass (Smith et al. 2000 p. 80) which increases fire risk.

Even more than invasive grasses, the recent spread of the invasive species African malcolmia (*Malcomia africana*) may pose a more serious threat to gypsum habitat and the Las Vegas bearpoppy populations (Bangle et al. 2010 p. 153). African mustard and Sahara mustard (*Brassica tourneforntii*) threatens the Las Vegas bearpoppy because they emerge early, are moderately salt tolerant, and stick to tires and shoes (Bangle et al. 2008 pp. 339–340). These characteristics allow these mustards to establish in the otherwise harsh gypsum outcrop environment and out-compete the Las Vegas bearpoppy. Their seeds also form a mucus membrane when exposed to water which adds to their ability to stick to tires and shoes allowing them to travel large distances and invade new areas. The number of introduced species has been found to be highest where road density was highest (Brooks and Berry 2006 p. 110) implying that human activities accelerate the spread of these species. Limiting human traffic into protected areas both limits disturbance and slows the spread of invasive species.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization pushes imperiled species towards extinction, especially in conjunction with other threats. It is not known whether overutilization threatens the Las Vegas bearpoppy, but given its limited geographic range and low population numbers, any utilization for commercial, recreational, scientific or educational purposes could pose a serious threat.

Other Natural or Manmade Factors Affecting its Continued Existence

Loss of Pollination Mutualism

Pollination mutualisms create and maintain ecosystem structure and function, as biotic pollination is responsible for >90% of flowering plant reproduction (Traveset & Richardson 2014 p. 91). Loss of plant-pollination mutualisms due to human activity is an increasing threat to ecosystem integrity across the globe (Traveset & Richardson 2014 p. 91; Portman et al. 2018b p. 594). Plant-pollinator mutualisms can become endangered as a result of biological invasions that alter seed set, genetic structure, and population growth of mutualists; climate change that causes phenological mismatch, such as bearpoppy bloom happening before emergence of its pollinators; and habitat loss and fragmentation that decreases the abundance of the poppy via decreased genetic diversity and seed set (Kiers et al. 2010 p. 1460; Traveset & Richardson 2014 p. 101 Figure 3).

Rare plants are duly affected by habitat fragmentation both directly via reduction in their own population connectivity and gene flow, but also indirectly through the decrease in pollinators (Hickerson 1998 p. 11). The reduced Las Vegas bearpoppy density and subsequent pollinator abundance results in runaway ecosystem degradation in which self-pollinating plants outcompete poppies and generalist pollinators outcompete specialists, further reducing the populations of both specialist poppies and their pollinators (Hickerson 1998 p. 11).

In the case of the Las Vegas bearpoppy and pollinator mutualisms, invasive honey bees cause invasion meltdown because honey bees facilitate the spread of non-native plants while competitively

displacing specialist pollinators (Traveset & Richardson 2014 pp. 99–101). Generalist pollinators like honey bees prefer plants with nectar rewards, reducing the quality of visits and seed set in native non-nectar producing plants (Traveset & Richardson 2014 p. 100) such as the rare bearpoppies (Portman et al. 2018b p. 603). This breakdown of mutualisms and pollination networks has been increasingly documented with the introduction of honey bees as they visit common, weedy plants and increase the seed set of invasive, non-native plants (Barthell et al. 2001 p. 1874; Aizen et al. 2014 pp. 324–325).

Non-native and Africanized Honey Bees

Honey bees displace native bees from preferred high quality forage plants through exploitative competition, higher number of individuals, and the longer activity period during which honey bees forage; and because they recruit nest mates to floral resources, honey bees overwhelm other species (Goulson 2003 p. 8; Dupont et al. 2004 p. 307; Thomson 2004 pp. 463–465, 2016 p. 5). Proximity to honey bee hives and/or presence of hive-dense apiaries forces native bees to forage greater distances on less pollen with a resultant reduction in fitness and, in turn, population (Henry & Rodet 2018 p. 2). A typical honey bee colony pastured for three months collects the equivalent of 110,000 (92,000-300,000 depending on number of bees per hive) native bee pollen provisions (Cane & Tepedino 2017 p. 207). As managed honey bees are not native to North America, the Las Vegas bearpoppy has not evolved to coexist with honey bees.

Africanized honey bees are a hybrid of European (*Apis mellifera ligustica*) and African (*Apis mellifera scutellata*) honey bee subspecies that spread into the Americas after accidental release in Brazil in the 1950s, making their way up to Texas in 1990, then to New Mexico, Arizona, Nevada, and California (Rabe et al. 2005 p. 307; Harrison et al. 2006 p. 1111; Kono & Kohn 2015 pp. 1–2). Feral Africanized honey bee colonies nest in rock cavities in the desert ecosystems (Harrison et al. 2006 p. 1112) and it is hypothesized that they are restricted to areas with warmer winter temperatures due to physiological and life history characteristics (Harrison et al. 2006 pp. 1114–1115; Kono & Kohn 2015 p. 10). While few managed European honey bee hives become feral, Africanized honey bees are more likely to swarm and start feral colonies in small cavity locations, underground, or in the open (Hodgson et al. 2010 p. 3), making them more prone to invade natural systems. The percent African honey bee mtDNA in Arizona feral honey bee colonies has steadily increased since their introduction (Harrison et al. 2006 p. 1113); to an average of 88% contained African mtDNA (Rabe et al. 2005 p. 310).

Africanized honey bees are now documented within the entire current range of the Las Vegas bearpoppy (Hodgson et al. 2010 p. 1). The expansion of the Africanized honey bees throughout the southwest negatively impacted historical populations of the bearpoppy's specialist pollinator, the Mojave poppy bee (Portman et al. 2018b p. 604). In recent years, Africanized honey bees were the main visitor to the Dwarf bearpoppy- the related congener (Portman et al. 2018b pp. 597–598) and in 2016 the Dwarf bearpoppy had reduced seed set compared to 2012 which was lower than seed set in 1997, when the poppy specialist Mojave poppy bee was present (Portman et al. 2018b p. 600). Portman et al. (2018a p. 12) found that 73% of honey bees caught in patches of Las Vegas bearpoppy exhibited the African mitotype. A clearly documented trait of Africanized honey bees that differs from European honey bees is their preference for prolific pollen collection due to the greater nutrition benefit of pollen for brood production (Harrison et al. 2006 p. 1117). This behavior of Africanized honey bees negatively

impacts the reproductive output of the Las Vegas bearpoppy by reducing the amount of pollen available for plant reproduction (Portman et al. 2018b pp. 601–602).

Climate Change

Human activities have increased global average temperatures 0.8-1.2°C above pre-industrial levels with a trend of about 0.2°C per decade due to past and current emissions (Intergovernmental Panel on Climate Change 2018 p. 4). At current emissions rates, global temperatures will increase by 1.5°C between 2030-2052, resulting in further sea level rise, increased incidence of severe weather events, and loss of ecosystems (Intergovernmental Panel on Climate Change 2018 p. 4, 8). At a warming of 1.5°C, temperature and precipitation extremes will be exacerbated; for example, extreme hot days, common in desert ecosystems, are expected to increase further to 3°C with cold nights warming up (Intergovernmental Panel on Climate Change 2018 pp. 8–9).

With climate change, rainfall is becoming less predictable and less frequent in the Mojave Desert (Smith et al. 2009 p. 34; Iknayan & Beissinger 2018 p. 3). Drought years coincide with reduced blooms, reduced pollen, and hence less successful reproduction and recruitment of the bearpoppy. The Las Vegas bearpoppy will only produce flowers in years with sufficient rainfall and may lose flower buds during dry years, leading to lower reproduction (WRA 2018 p. 150).

The Las Vegas bearpoppy has a life cycle wherein it produces a seed bank that remains dormant until periods of sufficient rainfall (The Nature Conservancy 2007 p. 52) to which their specialist pollinators respond, in a pulse-reserve paradigm typical of the Mojave Desert (Smith et al. 2009 p. 34). Plant and bee phenological cues differ and are likely to respond at different rates to climate change (CaraDonna et al. 2018 p. 9), with solitary bees also responding to body size as an emergence cue (Schenk et al. 2018 p. 6). As the Las Vegas bearpoppy has a short flowering period, any delay or acceleration in emergence due to climate change can cause its pollinators to miss the peak blooming period and consequently the bearpoppies will experience reduced seed set. Climate change also alters resource availability to the bearpoppy, as nonnative plants come to dominate the plant community due to decreased precipitation predictability (Brooks 2009 pp. 118–119) and reduction of frost due to nocturnal warming (Smith et al. 2009 pp. 33–34). The Las Vegas bearpoppy is also unlikely to adapt to climate warming without increased connectivity between fragmented patches.

Disease or Predation

Little information exists regarding the prevalence of plant disease or predation for the Las Vegas bearpoppy which presents an additional unknown for the long-term survival of the species. Diseases can hasten a species decline when populations are small or genetically homogeneous (Willi et al. 2006 p. 450). The only observed plant disease for the Las Vegas bearpoppy is a “patchy blue fungus” on the leaves of plants in the Gold Butte and Overton area (Mistretta et al. 1996 p. 12). More research and monitoring are needed to ensure that this or some other disease is not a risk to the Las Vegas bearpoppy. Inbreeding and decreased genetic diversity caused by habitat loss can increase susceptibility to diseases (Spielman et al. 2004 pp. 445–446) which underscores the need to promote genetic diversity and encourage gene flow. Herbivory from insects and vertebrates, appears to be low with only minor damage observed by researchers in 1988 (Mistretta et al. 1996 p. 12).

The Inadequacy of Existing Regulatory Mechanisms

The existing regulatory mechanisms are wholly inadequate for preventing the Las Vegas bearpoppy from heading to extinction. In order to determine any existing regulatory mechanisms for the protection of the Las Vegas bearpoppy, in the past two years, the petitioner sought, received, cataloged, and evaluated both publicly available information and 1,991 pages of documents obtained from federal and state agencies pursuant to Freedom of Information Act and similar state public records requests. The Las Vegas bearpoppy is a covered species under the Clark County MSHCP (Clark County Department of Comprehensive Planning 2000b pp. 2–7), is a BLM Nevada sensitive species, and state listed species in Arizona and Nevada, but these designations are voluntary and/or do not provide adequate protection.

Under BLM directives for sensitive species it states that "in compliance with existing laws, including the BLM multiple use mission as specified in the FLPMA [Federal Land Policy and Management Act], the BLM shall designate Bureau sensitive species and implement measures to conserve these species and their habitats" (Bureau of Land Management 2008 p. 36). Although the BLM must consider sensitive species in National Environmental Policy Act documents (Bureau of Land Management 2008 p. 37), the responsible official may still authorize impacts to occur as they are not obligated to conserve the species as would be required under Section 7 of the ESA. Some recent examples of this affecting the Las Vegas bearpoppy include the approved expansion of the Lima Nevada Gypsum Mine and the sprawl and development facilitated by Congressional land acts and the Southern Nevada Public Land Management Act that provided for disposal of BLM lands for private development. As such, the designation of the Las Vegas bearpoppy as a BLM Nevada sensitive species has not provided it or its habitat with adequate protections that will prevent its extinction. The Las Vegas bearpoppy is not specifically protected in the LMNRA. While there are constraints on livestock grazing and off-road vehicles in the LMNRA, there is no enforceable regulatory mechanism to prohibit illegal livestock grazing or to restrict recreation that specifically harms the Las Vegas bearpoppy and its habitat.

The Las Vegas bearpoppy is listed as critically endangered by the state of Nevada. However, this designation has been ineffective in protecting the species: "From 1988 through half of 2005, NDF [Nevada Department of Forestry] issued 26 out of 27 applications for take of plants and/or habitat... Most (41%) permits were for pipelines (gas, power, water), housing development (22%), and mining (19%), with just a few for airport development, a communications site, highway alignment, and military activity. Mitigation in early years involved transplant studies, none of which were successful," (The Nature Conservancy 2007 p. 60). Thus, the Nevada state endangered species listing actually prevented the destruction of bearpoppy individuals or habitat in only one instance. Indeed, an analysis by the Center for Biological Diversity Action Fund of Nevada's state endangered species protection program gave the state a grade of a "D+" in its ability to take on management of endangered species, as it did for Arizona (Kurose et al. 2019). The states alone have not and cannot protect the bearpoppy, and there are no existing regulatory mechanisms that would require them to do so.

At the local government level, the Clark County MSHCP and associated Incidental Take Permit were developed for 78 species of plants and animals in Clark County in 2001. The MSHCP take permit allows private land owners to destroy covered species on their private land in exchange for a per acre land clearance fee (Klein 2005 p. 4). The money is then invested by the County in conservation actions intended to offset the harm incurred by covered species from development. It is unclear, how, if at all,

conservation efforts funded by development fees collected pursuant to the MSHCP have helped promote the conservation of the Las Vegas bearpoppy, and regardless these efforts are certainly not adequate regulatory mechanisms.

The MSHCP purports to provide other conservation benefits for covered species. The MSHCP lists three "Measurable Biological Goals" for the Las Vegas bearpoppy:

"•Conserve populations on the North Las Vegas Airport, NAFB Area 3, and SNWA North Well Field
- No net unmitigated loss or fragmentation of habitat in IMAs, LIMAs, & MUMAs
- Maintain and/or improve bearpoppy habitat in 4 BLM management areas: Sunrise, Lovell Wash, Bitter Spring, Gold Butte"

(Clark County Department of Comprehensive Planning 2000a p. Table 2-5)

It is clear that the MSHCP has failed to achieve these goals in the 19 years since it was initiated. There has been unmitigated loss of and fragmentation of habitat in Multiple Use Managed Areas (MUMAs), in particular through the Lima Gypsum Mine expansion, and bearpoppy habitat has been degraded by OHVs, rather than maintained or improved, in the Bitter Spring and Gold Butte management areas.

Another failure of the MSHCP to protect the bearpoppy is through the lack of a protective Memorandum of Agreement. Many of the action points committed to by the County and agencies under the MSHCP relied on the development and implementation of a "Las Vegas Bearpoppy Memorandum of Agreement," (Clark County Department of Comprehensive Planning 2000a Table 2-5). This putative memorandum is referenced throughout the MSHCP. However it appears that such a memorandum was never formalized or implemented.

Additionally, BLM has not met its obligations under the MSCHP. Protective Measure BLM(107) is "Allow no net loss of Las Vegas bearpoppy habitat on Public Land from Federally approved projects through mitigative actions including avoidance and rehabilitation," (Clark County Department of Comprehensive Planning 2000a pgs. 2-243). BLM has clearly violated this measure in its authorization of the Lima Gypsum expansion, allowing for a net loss of habitat and relying on unproven mitigation measures. Land Use Policy Measure BLM (220) is "Designate important bearpoppy habitat in Lovell Wash (Muddy Mountains) and the Bitter Springs as ACECs for the protection of Las Vegas bearpoppy and sticky ringstem. These areas should be limited to designated roads and trails, closed to OHV competitive events and all forms of mineral entry. (Land Use Amendment Required)," (Clark County Department of Comprehensive Planning 2000a pgs. 2-250). BLM has failed to designate such ACECs, continues to allow competitive OHV (off-highway vehicle) events in the area, and the areas are still open to mineral entry, presenting a clear and emerging threat in the Bitter Springs Area.

The most recent review of the species for extended coverage of the Las Vegas bearpoppy under the MSHCP stated: "Based on the critically endangered status designation by the State of Nevada and range restricted primarily to Clark County, Nevada, we recommend this species for coverage. Although most, if not all, of the species occurrence is on Federal lands, if the species were considered for listing it is likely the federal agencies responsible would be compelled to implement actions to avoid listing (candidate conservation agreement)." (WRA 2018 p. 151).

To the extent that any voluntary, i.e. non-regulatory, mechanisms exist to protect the Las Vegas bearpoppy, FWS cannot rely on voluntary measures to deny listing of species. Voluntary and

unenforceable conservation efforts are simply *per se* insufficient as "regulatory mechanisms" under 16 U.S.C. 1533(a)(1)(d):

> [T]he Secretary may not rely on plans for future actions to reduce threats and protect a species as a basis for deciding that listing is not currently warranted . . . . For the same reason that the Secretary may not rely on future actions, he should not be able to rely on unenforceable efforts. Absent some method of enforcing compliance, protection of a species can never be assured. Voluntary actions, like those planned in the future, are necessarily speculative . . . . Therefore, voluntary or future conservation efforts by a state should be given no weight in the listing decision (*Oregon Natural Resources Council v. Daley,* 6 F. Supp.2d 1139, 1154-155 (D. Or. 1998).

As demonstrated in this petition, the threats faced by the Las Vegas bearpoppy throughout its range such as grazing, recreation, mining, loss of pollinators, climate change, fragmentation, and inbreeding due to isolation are not adequately addressed by any of the plant's current designations. Threats to the Las Vegas bearpoppy's continued existence have not been ameliorated via voluntary action or other existing regulatory mechanisms, including the MSHCP. The only adequate regulatory mechanism available to save the Las Vegas bearpoppy starts with listing it under ESA.

Lack of Threat Amelioration

The Las Vegas bearpoppy is not currently protected from grazing, recreation, gypsum mining, loss of pollinators, or climate change. Although domestic animal grazing is prohibited in LMNRA, wild burro grazing in the Mojave Desert is concentrated in the Lake Mead area (Abella 2008 p. 810) and currently there is illegal cattle grazing on the National Park Service lands around Lake Mead (Bureau of Land Management 2014; Ellis & Martinez 2014 p. 1; Yachnin 2017 p. 1). Further, recent email correspondence between BLM and Service staff discusses how despite the ban on grazing to conserve the endangered desert tortoise, there is widespread unauthorized grazing in Nevada, particularly in the LMNRA, including "extremely high" numbers of cattle and wild burros (Lambeth 2018 p. 4). In addition, cattle eat, kill, and reduce reproduction of bearpoppies, as evidenced by their impact to the Dwarf bearpoppy since 2014 to the knowledge of the BLM and the Service ("U.S. Fish and Wildlife Service Emails" 2014 p. 1; "Bureau of Land Management Emails" 2018 pp. 1, 12–13, 24; Lewinsohn 2018 p. 1). There is no evidence that the illegal grazing in the LMNRA is being ameliorated.

Recreation impacts to the Las Vegas bearpoppy and its habitat are not managed within occupied and suitable habitat, nor has law enforcement successfully addressed unauthorized and illegal uses (U.S. Fish and Wildlife Service 2016 p. 40). When reviewing existing regulatory mechanisms for the petitioned Las Vegas Buckwheat, the Service stated "Nation-wide enforcement of off-highway vehicle restrictions on federal land is limited by the low number of law enforcement officers on staff (Gregory 2008, pp. 1-12). In southern Nevada on BLM-managed lands outside of the Red Rock Canyon National Conservation Area, there is roughly 1 officer for every 370,200 acres of the District, and several portions of the District (Moapa, Gold Butte, and Nye County) are currently limited to 1 duty officer (Marrs-Smith 2007, p. 1). The ability to regulate off-highway vehicle activity in southern Nevada is not expected to improve in the near future." (Blair 2009 p. 14).

There is no regulatory mechanism that ameliorates the negative effect of honey bees on the bearpoppy's pollinators, their facilitation of invasive plants, or the hybridization of African with European honey bees. Placement of apiaries is allowed on public land as a categorical exclusion under 36 CFR 220.6 and in some cases encouraged (Pollinator Health Task Force 2015 pp. 44, 48; Dickie 2015 p. 2) and with honey bee farmers looking to federal lands for pesticide free areas (Dickie 2015 p. 3), this is an imminent threat not addressed by existing regulations. As apiaries are a substantial threat to the whole ecosystem, hives placement on federal public lands should be prohibited (Geldmann & González-Varo 2018 pp. 1–2).

The two mines that directly destroy prime Las Vegas bearpoppy habitat are the Lima Nevada Gypsum Mine and the Pabco Gypsum Mine. These mines remove Las Vegas bearpoppies despite both being in the Rainbow Gardens ACEC (Bureau of Land Management 2018a p. 17). The inadequate mitigation measures outlined for the mine expansion does nothing to protect the Las Vegas bearpoppy and instead hastens its extinction.

Only by listing the Las Vegas bearpoppy under the ESA could its threats be ameliorated.

Lack of Connected Quality Habitat

The Las Vegas bearpoppy lacks crucial connectivity between its isolated populations, breaking down its population dynamics. Region-wide management through the MSHCP and the Nevada FWS has failed to maintain overall connectivity to reduce the negative effects of habitat fragmentation. The distances between patches, especially in the Las Vegas Valley and Apex regions, are insurmountable by pollinator and isolated populations in these regions have and will continue to experience major loss of genetic diversity. There is clear evidence for pollen dispersal limitation at the local scale and, as native bees colonize patches with more host plants at the landscape scale, areas of high density bearpoppy pollen resources are needed to promote historic levels of genetic exchange and to buffer against extinction (Harper & Van Buren 2004 p. 490; Franzén & Nilsson 2009 p. 82, 2013 p. 1406).

Outside of the LMNRA, there are only a few defensible populations of the Las Vegas bear poppy. Decades of urban expansion have cut off these areas from each other, leaving them separated by between 3.5 and 10 miles- distances longer than foraging ranges of all local native bees. These relic populations in heavily urbanized locations are of little conservation value without connecting land and pollination service, but they must remain preserved for their educational and intrinsic value. There is also a population in the Apex area which is largely separated from other populations. This population faces a dire threat from industrial sprawl – the private land populations are under acute threat of development and the public land populations could easily be turned into disposal lands in future public lands legislation. Additionally, the public lands populations are under threat from OHV use. Isolation of makes this population vulnerable to stochastic events and every effort needs to be made to preserve the habitat southward from Apex to provide what connectivity is possible with other extant populations.

The Service must protect occupied and potential habitat from urban development, degradation, and additional fragmentation across the bearpoppy's range. Conserving existing connecting habitat is doubly important because propagation and translocation of bearpoppy individuals have proven largely futile in reestablishing populations (Meyer 1986 p. 3; Schweers 1997 p. 1; Bailey 2019 p. 1). The latest research indicates that cryptogamic crusts play a vital role in the successful germination of bearpoppy seeds; therefore, priority conservation actions for the bearpoppy must include protection of the

remaining populations as well as protection of surrounding suitable habitat with cryptogamic crusts (Thompson and Smith 1997 p. 167; Bailey et al. 2019 pg. 1). The remaining populations of the Las Vegas bearpoppy on public land should not be fragmented or further reduced in size to ensure its continued survival as a species.

Lack of Specialist Pollinators

In the Lake Mead National Recreation Area, the two most important floral visitors for the Las Vegas bearpoppy were *Magandrena enceliae* and the poppy specialist *Perdita meconis* (Mojave poppy bee) (Tepedino and Hickerson 1996 p. 11). Clark County recognizes this essential mutualism with the Mojave poppy bee, and in the Comprehensive Planning document notes: "the relationship between pollinators and species should be monitored; the populations may be mutually dependent and both necessary for successful conservation management" (Clark County Department of Comprehensive Planning 2000b p. 216). However, this monitoring has not provided any actual protection. Viability of the Las Vegas bearpoppy is poor when only generalist pollinators, such as the honey bee, are present but good to very good if specialist pollinators are in healthy numbers or dominate the pollinator community, respectively (The Nature Conservancy 2007 p. 54). Hickerson 1998 (p. 47) suggested translocation of specialist pollinators, particularly the Mojave Poppy bee, to the Las Vegas Valley; preceded by creation of floral-resource corridors with undisturbed soil, to enhance populations of the bearpoppy. However to date, none of these recommendations have been implemented.

Weakened Protections under the MSHCP

While the MSHCP is a potential existing regulatory mechanism to protect the Las Vegas bearpoppy, it has been inadequate and ineffective as evidenced by the continual decline and threats to the bearpoppy population and the inability of agencies to achieve the MSHCP's stated goals for the bearpoppy. As described throughout this petition, the MSHCP has failed to protect the Las Vegas bearpoppy and its habitat. Clark County has long pursued a modification of the MSHCP, which would substantially weaken the agreement. In particular they want to accomplish goals such as reducing the covered species list, increase the duration of the USFWS take permit, and perhaps most importantly, increase the disturbance acreage permitted under the take permit (Clark County Desert Conservation Program 2019).

In a further development, since the County has not yet obtained a revision to its MSHCP or take permit, it has made the unorthodox proposal of congressionally amending the MSHCP and take permit, through a County Commission-passed resolution asking Nevada's congressional delegation, for, among other things, a revision to the allowable disturbance acreage (Clark County Air Quality Department 2019). Determining how this proposal would impact the bearpoppy will prove even more elusive than the original modification proposal, since Congress would be acting unilaterally, outside the normal decision making processes as informed by NEPA and the Endangered Species Act, proceeding into making land use decisions without environmental review.

It is unclear how the proposal to modify, whether administratively or congressionally, the MSHCP might impact the bearpoppy. While the majority of the extant populations within the Las Vegas Valley are shielded from active development due to their proximity to airports, there are unprotected occupied patches of bearpoppy habitat near the Apex area, which would be squarely within the targets

of development to be authorized under a modified MSHCP. Additionally, further modifications to BLM and the County's responsibilities for protecting the bearpoppy could be made, weakening the already inadequate and insubstantial protections provided by the extant MSHCP.

The proposed weakening of the MSHCP is a threat to the bearpoppy because it introduces significant uncertainty in the future management of the plant, at a time when climate change and a variety of threats demand more significant protections. This is a major reason why ESA listing is so essential for preventing potentially catastrophic declines for this imperiled species at this time.

Request for Critical Habitat Designation

We urge the Service to designate critical habitat for the Las Vegas bearpoppy concurrent with its 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 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).

Critical habitat is an effective and important component of the ESA, without which the Las Vegas bearpoppy's chance for survival significantly diminishes. Petitioners thus request that the Service propose critical habitat for the plant concurrently with its listing.

Conclusion

In this petition, we have carefully assessed the best scientific and commercial information available regarding the Las Vegas bearpoppy. We have reviewed the best scientific and commercial information available regarding the historic, present, and future threats faced by the Las Vegas bearpoppy and have determined that the species is in danger of extinction throughout its range. 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).

There is no question that protecting the Las Vegas bearpoppy is warranted under the act as it is imperiled by 1) the present or threatened destruction, modification, or curtailment of its habitat or range; 4) the inadequacy of existing regulatory mechanisms; and 5) other natural or manmade factors affecting its continued existence that includes loss of habitat or range, rampant urbanization, recreation, grazing, climate change, and loss of specialized pollinator mutualisms. There are no existing regulatory

mechanisms which are adequate to protect the Las Vegas bearpoppy. The Service must act promptly to protect this species and to designate critical habitat in order to prevent its extinction and reverse its precipitous decline in range and habitat. Listing of the Las Vegas bearpoppy as an endangered species is the only way to ensure the continued existence of this extraordinary species that defines the Mojave Desert of the American Southwest.

Please contact Tara Cornelisse at 503-283-5474 and/or tcornelisse@biologicaldiversity.org or Patrick Donnelly at 702-483-0449 and/or pdonnelly@biologicaldiversity.org if you have any questions or need any clarification on the above information.

Sincerely,

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Jess Tyler

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