

Recovery Plan for *Coryphantha sneedii* var. *sneedii* (Sneed pincushion cactus) and *Coryphantha sneedii* var. *leei* (Lee pincushion cactus)

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DRAFT AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for these species since the Sneed and Lee Pincushion Cacti (*Coryphantha sneedii* var. *sneedii*, *Coryphantha sneedii* var. *leei*) Recovery Plan (Recovery Plan) was completed. In this proposed modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and the rationale supporting the proposed recovery plan modification. The proposed modification is shown as an appendix that supplements the Recovery Plan, superseding only page 19 (U.S. Fish and Wildlife Service (Service) 1986: 19).

**For
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Southwest Region
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BACKGROUND INFORMATION

Recovery plans should be consulted frequently, used to initiate recovery activities, and updated as needed. A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification. Keeping recovery plans current ensures that the species benefits through timely, partner-coordinated implementation based on the best available information. The need for, and extent of, plan modifications will vary considerably among plans. Maintaining a useful and current recovery plan depends on the scope and complexity of the initial plan, the structure of the document, and the involvement of stakeholders.

An amendment involves a substantial rewrite of a portion of a recovery plan that changes any of the statutory elements. The need for an amendment may be triggered when, among other possibilities: 1) the current recovery plan is out of compliance with regard to statutory requirements; 2) new information has been identified, such as population-level threats to the species or previously unknown life history traits, that necessitates new or refined recovery actions or criteria; or 3) the current recovery plan is not achieving its objectives. The

amendment replaces only that specific portion of the recovery plan, supplementing the existing recovery plan, but not completely replacing it. An amendment may be most appropriate if significant plan improvements are needed, but resources are too scarce to accomplish a full recovery plan revision in a short time.

Although it would be inappropriate for an amendment to include changes in the recovery program that contradict the approved recovery plan, it could incorporate study findings that enhance the scientific basis of the plan, or that reduce uncertainties as to the life history, threats, or species' response to management. An amendment could serve a critical function while awaiting a revised recovery plan by: 1) refining or prioritizing recovery actions that need to be emphasized, 2) refining recovery criteria, or 3) adding a species to a multispecies or ecosystem plan. An amendment can, therefore, efficiently balance resources spent on modifying a plan against those spent on managing implementation of ongoing recovery actions.

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The recovery criteria were collectively developed and reviewed by species experts that included biologists and botanists from the Bureau of Land Management (BLM), National Park Service, Natural Heritage New Mexico (NHNM), New Mexico Energy, Minerals and Natural Resources Department, U.S. Forest Service, and the Service. These individuals and entities comprise the Species Working Group. The development process was informed by the best available science regarding species biology and current threats. The recovery criteria were designed to be objective and quantifiable, in order to meet the conditions needed to ensure species viability through sustainment of populations in the wild that demonstrate resiliency, redundancy, and representation (Wolf et al. 2015: entire).

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list." Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006: 2) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

Recovery Criteria

Although there is a final recovery plan, it does not reflect the most up-to-date information on the species' biology, nor does it address all five listing factors that are relevant to the species. When the Recovery Plan was finalized in 1986, limited data made it difficult to quantify habitat requirements with enough precision to establish detailed and measureable delisting criteria (Service 1986: entire).

Synthesis

In 2015, we completed a 5-year review for both species (Service 2015: entire). The following summarizes their current status.

Sneed pincushion cactus

Major populations (more than 50 individuals) of Sneed pincushion cactus occur in the southern Organ Mountains on BLM and Fort Bliss lands, Doña Ana County, New Mexico; northern Franklin Mountains, BLM, Fort Bliss, and private, Doña Ana County, New Mexico; southern Franklin Mountains, Franklin Mountains State Park, El Paso County, Texas; and Guadalupe Mountains on National Park Service, Forest Service, BLM, and private lands, Eddy County, Texas. The Guadalupe Mountain population needs further genetic study to confirm it is this taxon (Baker and Johnson 2000: 583; Baker 2007: 12; Porter et al. 2012: entire). Fort Bliss monitoring sites (southern Organ and northern Franklin Mountains) showed a declining trend in abundance from 1997-2011 (Gulf South Research Corporation 2011: 5-2, 5-3). Tonne (2001: 14) concluded that populations at BLM monitoring sites in the southern Organ and northern Franklin Mountains were stable from 1989 to 2001.

Lee pincushion cactus

Lee pincushion cactus is known only from the Guadalupe Mountains within, and immediately adjacent to, Carlsbad Caverns National Park (CCNP). At the time of listing, it was known to only occur in “several canyons” (Weniger 1969: 142). The current view is that this subspecies includes individuals from six canyons scattered over approximately 22 kilometers (14 miles) of the Guadalupe Mountains on CCNP and adjacent BLM lands. These locations can be grouped into two populations based on proximity. These populations are not consistently monitored; therefore, there is no dataset for determining population trends. CCNP has good survey information on Lee pincushion cactus that could be used for future monitoring (Tonne 2003: Appendix 2; 2005: Appendix 2).

The most recent genetic study suggests that Lee pincushion cactus is distinct from Sneed pincushion cactus though the results were not definitive (Porter et al. 2012: entire). Morphological analysis suggests the two taxa are not distinct (Baker 2007: 21).

While there appears to be suitable habitat in and around known locations, the presence of the Lee pincushion cactus drops out abruptly in habitat that appears to be continuous. This makes it difficult to infer where suitable habitat might exist beyond known colonies. We lack the ability to understand why this cactus does not occur more frequently when suitable habitat appears relatively common.

Threats

In the 1986 Recovery Plan, threats for Sneed and Lee pincushion cacti were listed as direct collection, destruction or modification of habitat, and natural limiting factors and threats such as seed predation, grazing, competition for space, or special edaphic requirement. For Lee pincushion cactus, wildland fires are discussed as having both positive and negative effects. However, the Recovery Plan also indicated that the species are too poorly understood to identify specific natural threats.

Pressure from collectors is seemingly alleviated by availability of captively propagated individuals on the market. Plants are now available for purchase through distributors mainly in California. Monitoring and research still needs to be conducted on both species to determine the effects of known threats. Population size has been monitored by some agencies periodically,

since listing, yet more monitoring is needed. Currently, the main threats are wildfires (Lee pincushion cactus) and climate change (both species) (Service 2015: 15).

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or that the cacti no longer meet the definition of endangered or threatened species and may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term “endangered species” means any species (species, subspecies, or Distinct Population Segment) which is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

We establish delisting criteria for Sneed and Lee pincushion cacti as follows:

Delisting Recovery Criteria

Current recovery criteria

Recovery criteria in the 1986 Recovery Plan are (Service 1986: 19):

Criteria for delisting the Sneed and Lee pincushion cacti cannot be established until more is known about their habitat and abundance. Accomplishment of the tasks in this plan should provide the data needed to establish full delisting criteria.

Amended recovery criteria

The Sneed pincushion cactus and Lee pincushion cactus will be considered for delisting when:

Delisting Criterion 1: Resiliency

1. All core populations will demonstrate stable or increasing trends in abundance over a 20-year period. This will be based on periodic demographic trend monitoring and analysis implemented under the recovery actions.

Justification: Natural limiting factors (climate change and fire) are addressed by demonstrating stability in population size over a range of conditions. Sneed pincushion cactus has three core populations (Guadalupe, Organ, and Franklin Mountains). Lee pincushion has two core populations that are located in CCNP. Species persistence depends on stable or increasing demographic trends with recruitment of new individuals equaling or exceeding mortality. Trend measurements would be based on standardized, statistically rigorous, long term monitoring protocols developed by the Species Working Group in consultation with statistics experts. Twenty years provides an appropriate amount of time to observe the populations’ demographic performance for several reasons. First, a 20-year window is equivalent to approximately two generations of Sneed and Lee pincushion cacti, grounding the

criteria in a biologically relevant timeframe. Observing the population for longer than a single generation will provide assurance that population metrics such as reproduction and mortality rates are fluctuating within expected levels and that populations are performing such that recovered status is likely to be maintained after delisting. Specifically, it allows us to observe population trend, which we expect to be stable or growing as populations achieve recovery, although we also expect annual fluctuations could include population declines for one or a few years during a 20-year period. We estimate that a 20-year period will include one catastrophe event (i.e., prolonged drought or wildfire), allowing us to ensure that the population is able to rebound following such an event.

Delisting Criterion 2: Redundancy

- 2a. Maintain a minimum of three geographically separated core populations for each species over a 20-year period.

Justification: Maintaining a geographically broad species distribution will help guard against the effects of wild fires and climate change. The core populations of Sneed and Lee pincushion cacti occur in geographically separated areas that help limit the risk of catastrophe events. Because of the limited number of geographically separated populations, no loss of the core populations will be necessary for long-term viability of these species.

Lee pincushion only

- 2b. A minimum of one new core population will be discovered or established outside the current range and wholly separated geographically from the other core populations, and remain occupied for 10 years out of the 20-year survey period.

Justification: A newly established or discovered population of Lee pincushion cactus will be needed to increase redundancy to guard against loss from changing climate conditions (warm temperatures and less rainfall). This new population for Lee pincushion will need to be established or discovered outside the current range. The location will be determined by modeling habitat requirements and predicted climatic conditions into the foreseeable future (Kleppel et al. 2012: entire).

Delisting Criterion 3: Representation

- 3a. Maintain genetic diversity within all core populations as measured by the fixation indices inbreeding coefficient (F_{IS}) at or within one standard deviation of the F_{IS} of a closely related species with similar reproductive strategies and demonstrated acceptable viability.
- 3b. Maintain presence in 80 percent of subpopulations over 20-year monitoring period and outside of the core populations, with any subpopulation extirpations compensated by a newly identified or colonized subpopulation.

Justification: Genetic makeup of the species is important to long-term viability. Genetic diversity is often correlated with plant fitness, and more genetically diverse populations are also more fit. Based on current and future genetic studies we will be able to determine the genetic diversity of the species. The degree of genetic diversity within core sites is important for several reasons. First, diversity within and among populations should confer populations, and the species, greater resistance to pathogens and parasites, and greater adaptability to environmental stochasticity (random variations, such as annual rainfall and temperature patterns) and environmental changes. Second, adequate genetic diversity enables continuing reproductive success and gene flow within and among core sites and other subpopulations is essential for maintenance of genetic diversity and adaptive capacity over time. The metric used to measure genetic diversity may be reevaluated by the Species Working Group as new strategies and technologies become available.

The remaining parts of the population are broken up into small groups of individuals. We manage the data on the Sneed and Lee pincushion cacti populations through Element Occurrences (EOs) that are groups of individuals in discrete areas that are in close proximity (NatureServe 2002: 13). We used the EOs to characterize the scattered individuals outside the core populations that comprise the occupied range and identified them as subpopulations. These subpopulations provide connectivity and increase genetic diversity across the range of environmental conditions occupied. We consider a population to have good representation when it demonstrates a stable or increasing trend in occurrence for 80 percent of subpopulations outside of the core sites over a 20-year timeframe. Eighty percent of subpopulations was estimated by the Species Working Group to be sufficient to maintain representation throughout the species range. We estimate that a 20-year period will include one catastrophe event (i.e., prolonged drought or wildfire), allowing us to ensure that the subpopulations are able to rebound following such an event.

Delisting Criterion 4: Adequate Regulatory Mechanisms

4. Develop and implement a Habitat Management Plan (HMP) for Sneed and Lee pincushion cacti conservation.

Justification: The HMP addresses all five factors on the lands it would cover. The HMP will help reduce the risk of destruction or modification of habitat, such as road or trail construction, and development. This plan will keep the species relevant in decision-making and will help keep the species from being federally relisted. Threats, such as collection, fire, and overgrazing, will be addressed through the HMP. Each major land management agency should be a party to the HMP. The HMP will be rangewide but will have site-specific measures that can be implemented as appropriate on lands within each agencies jurisdiction. The HMP should be incorporated into regulatory agency management plans (BLM – Resource Management Plan, National Park – General Management Plan). By incorporation

into agency management plans adequate protection is ensured to persist post-delisting.

Delisting Criterion 5

5. A Service approved post-delisting monitoring plan will be implemented.

Justification: A post-delisting monitoring plan is necessary to ensure the ongoing conservation of the species and the continuing effectiveness of management actions.

Rationale for Recovery Criteria

All classification decisions consider the following five factors: 1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; 2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; 3) is disease or predation a factor; 4) are there inadequate existing regulatory mechanisms in place outside the Act (taking into account the efforts by states and other organizations to protect the species or habitat); and 5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the Federal Register and seek public comment and peer review. Our final decision is announced in the Federal Register.

The amended criteria addresses all threats, which have been ameliorated since the populations are stable or increasing. Otherwise, the decreasing populations would be caused by a known threat. All addressable threats that do not cause the populations to decline would be negligible. If the populations are decreasing, the species would not warrant to be delisted. There will be threats, such as drought and wildfire that will continue to exist in a natural environment.

In addition to minimizing and ameliorating the threats identified above, the recovery criteria for Sneed and Lee pincushion cacti should also address the conservation principles of the 3-Rs: representation, resiliency, and redundancy (Wolf et al. 2015: 204).

Resiliency

Resiliency ensures that populations are sufficiently large to withstand stochastic events. No loss of the three core populations (both species), and stable or increasing trends in abundance, will allow for recovery. In order to have a stable, persistent population, it is necessary to have at least a certain number of plants at all life stages in that population, including seeds in a seed bank, seedlings, and mature plants. If there is an increasing trend it would follow that mature plants are setting and producing sufficient seeds; there is an adequate, viable seed bank; conditions exist such that germination is effective; and the habitat needs of the juveniles are being provided. At this level of resiliency, the identified threats have been ameliorated to the extent that the population is secure from random population fluctuations, and mortality rates are sufficiently low to allow for stable, long-term persistence of the populations.

Redundancy

Redundancy provides for security against extinction from catastrophic events that could impact a single core population by ensuring that one or more additional core populations persist. No loss

of the three core populations (both species) will provide for redundancy. A redundant population is one with sufficient genetic and ecological representation to ensure resiliency.

Representation

Representation involves conserving the breadth of the genetic makeup of the species to conserve its adaptive capabilities. While having Sneed and Lee pincushion cacti across large portions of their range ensures ecological representation, genetic diversity ensures genetic representation. Representation ensures that small population size and genetic threats have been ameliorated. Maintaining the genetic differences among populations as their potential genetic and life history attributes may buffer the species' response to environmental changes over time. Species that are well distributed across their range are considered less susceptible to extinction and more likely to be viable than species confined to a small portion of their range (Carroll et al. 2010: entire; Redford et al. 2011: entire).

Based on the best available information that includes the input and data from species experts during our recovery criteria review, these amended recovery criteria provide quantifiable measures for identifying and implementing recovery actions, a means to measure progress towards recovery, and the ability to recognize when recovery will be achieved.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

Not Applicable

COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS

Not Applicable

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