

RECOVERY PLAN AMENDMENTS FOR 20 SOUTHWEST SPECIES

The U.S. Fish and Wildlife Service has identified best available information that indicates the need to amend recovery criteria for the below species. Each amendment is recognized as an addendum that supplements the existing recovery plan.

<p>Brady Pincushion Cactus (<i>Pediocactus bradyi</i>) Recovery Plan Original Recovery Plan Approved: March 28, 1985 Page(s) Superseded: 19-34</p>
<p>Endangered Karst Invertebrates (Travis and Williamson Counties, Texas) Recovery Plan Original Recovery Plan Approved: August 25, 1994 Page(s) Superseded: 86-88 Species Included: Bee Creek Cave harvestman (<i>Texella reddelli</i>) Bone Cave harvestman (<i>Texella reyesi</i>) Coffin Cave mold beetle (<i>Batrisodes texanus</i>) Kretschmarr Cave mold beetle (<i>Texamaurops reddelli</i>) Tooth Cave spider (<i>Tayshaneta=Neoleptoneta myopica</i>) Tooth Cave ground beetle (<i>Rhadine persephone</i>) Tooth Cave pseudoscorpion (<i>Tartarocreagris texana</i>)</p>
<p>Holy Ghost Ipomopsis (<i>Ipomopsis sancti-spiritus</i>) Recovery Plan Original Recovery Plan Approved: September 26, 2002 Page(s) Superseded: 18-21</p>
<p>Knowlton Cactus (<i>Pediocactus knowltonii</i>) Recovery Plan Original Recovery Plan Approved: March 29, 1985 Page(s) Superseded: 16</p>
<p>Kuenzler Hedgehog Cactus (<i>Echinocerus fendleri</i> var. <i>kuenzleri</i>) Recovery Plan Original Recovery Plan Approved: March 28, 1985 Page(s) Superseded: 13</p>
<p>Sacramento Prickly Poppy (<i>Argemone pleicantha</i> ssp. <i>pinnatisecta</i>) Recovery Plan Original Recovery Plan Approved: August 31, 1994 Page(s) Superseded: 16-17</p>
<p>Siler Pincushion Cactus (<i>Pediocactus sileri</i>) Recovery Plan Original Recovery Plan Approved: April 14, 1986 Page(s) Superseded: 19-41</p>
<p>Sneed and Lee Pincushion Cacti Recovery Plan Original Recovery Plan Approved: March 21, 1986 Page(s) Superseded: 19 Species Included: Sneed pincushion cactus (<i>Coryphantha sneedii</i> var. <i>sneedii</i>) Lee pincushion cactus (<i>Coryphantha sneedii</i> var. <i>leei</i>)</p>
<p>Socorro Isopod (<i>Thermosphaeroma thermophilum</i>) Recovery Plan Original Recovery Plan Approved: February 16, 1982 Page(s) Superseded: 6-7, 10-11, 13</p>

Star Cactus (*Astrophytum asterias*) Recovery Plan

Original Recovery Plan Approved: August 26, 2003

Page(s) Superseded: 11-14

Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*) Recovery Plan

Original Recovery Plan Approved: March 18, 1987

Page(s) Superseded: iii, 14-15

Zapata Bladderpod (*Lesquerella thamnophila*) Recovery Plan

Original Recovery Plan Approved: July 14, 2004

Page(s) Superseded: 9-11

Zuni Fleabane (*Erigeron rhizomatus*) Recovery Plan

Original Recovery Plan Approved: September 30, 1988

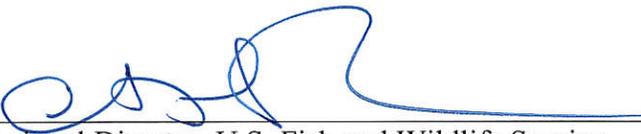
Page(s) Superseded: 14

For

**U.S. Fish and Wildlife Service
Southwest Region
Albuquerque, New Mexico**

August 2019

Approved:


Regional Director, U.S. Fish and Wildlife Service

Date:

8/28/19

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

Original Approved: March 21, 1986

Original Prepared by: Kenneth Heil, San Juan College, Farmington, New Mexico, and Steven Brack, Belen, New Mexico.

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
U.S. Fish and Wildlife Service
Southwest Region
Albuquerque, NM 87103**

August 2019

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 on BLM, Fort Bliss, and private lands, Doña Ana County, New Mexico; southern Franklin Mountains on Franklin Mountains State Park lands, 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 have not consistently been monitored. The New Mexico Forestry Division has been monitoring Lee pincushion cactus at Carlsbad Caverns National Park since 2014, funded by the Service under Section 6 (Service 2015; Roth 2014, 2015, 2016 2017, 2018 (in draft)). Hence this information provides the most up-to-date and consistent dataset available for population trends of this cactus, including the response of the species to fire (Roth 2014-2018). 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 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 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 Carlsbad Caverns National Park. 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 at most 6 generations of Sneed and Lee pincushion cacti, grounding the criteria in a biologically relevant timeframe. We want a minimum of 2 generations to be monitored during this 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 (use Criterion 1) 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. A newly discovered core population must demonstrate a stable or increasing trend in abundance (Criterion 1) for 10 years. If the population is established (via translocation), we are creating an additional population that may or may not persist, and will have virtually no impact on the naturally established populations. 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 listing factors on the lands it would cover. Thresholds of acceptable declines may be discussed during the HMP process that would trigger management decisions. 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 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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APPENDIX A – SUMMARY OF PUBLIC, PARTNER, AND PEER REVIEW COMMENTS RECEIVED

Summary of Public Comments

The Service published a notice of availability in the *Federal Register* on January 31, 2019 (84 FR 790-795) to announce that the draft amendment for the Sneed and Lee Pincushion Cacti (*Coryphantha sneedii* var. *sneedii*, *Coryphantha sneedii* var. *leei*) Recovery Plan (Recovery Plan) was available for public review, and to solicit comments by the scientific community, State and Federal agencies, Tribal governments, and other interested parties on the general information base, assumptions, and conclusions presented in the draft revision. An electronic version of the draft Recovery Plan amendment was also posted on the Service's Species Profile websites: (<https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=4706> and <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=2504>).

The Service received four responses to the request for public comments. These were from the U.S. Bureau of Land Management, the New Mexico Energy, Minerals, and Natural Resources Department, the Center for Biological Diversity, and the Energy and Wildlife Action Coalition.

Public comments ranged from providing minor editorial suggestions to specific recommendations on the amendment content. We have considered all substantive comments; we thank the reviewers for these comments and to the extent appropriate, we have incorporated the applicable information or suggested changes into the final Recovery Plan amendment. In general, these comments did not lead to significant changes in the draft plan. Below, we provide a summary of public comments received; however, some of the comments that we incorporated as changes into the amendment did not warrant an explicit response and, thus, are not presented here.

Comment (1): Concern that, “criteria are being added in the absence of any scientific peer review and that this will lead to a failure on the Service’s part to follow the best-available science.”

Response: Peer review was conducted following the publication of the Notice of Availability, and in accordance with the requirements of the Endangered Species Act (Act). Below we provide a detailed summary of peer review comments and our responses, when appropriate.

Comment (2): Concern that, “the decision to update recovery criteria for these 42 species as a group is indicative of the Service moving away from utilizing recovery teams and outside scientific expertise.”

Response: Section 4 of the Act provides the Service with the authority and discretion to appoint recovery teams for the purpose of developing and implementing recovery plans. The current effort to update recovery plans with quantitative recovery criteria for what constitutes a recovered species is not indicative of the future need for, and does not preclude the future utilization of, recovery teams to complete recovery planning needs for listed species.

Comment (3): New and significant information has been developed in the years since the existing Recovery Plan was adopted. Updating this plan can serve to better inform the Service, the regulated community, and Federal, State, and local resource agencies.

Response: A recovery plan should be a living document, reflecting meaningful change when new

substantive information becomes available. Keeping a recovery plan current increases its usefulness in recovering a species by ensuring that the species benefits through timely, partner-coordinated implementation based on the best available information.

Comment (4): The Service should consider whether the updated recovery criteria would be less burdensome on Federal agencies and the regulated community than the existing criteria.

Response: Recovery plans are guidance documents that outline how best to help listed species achieve recovery, but they are not regulatory documents. Recovery plans are intended to establish goals for long-term conservation of listed species and define criteria that are designed to indicate when the threats facing a species have been removed or reduced to such an extent that the species may no longer need the protections of the Act.

Recovery criteria are achieved through the funding and implementation of recovery actions by both the Service and our partners. In addition to the existing recovery actions included in each of these recovery plans, the amendments address the need for any new, site-specific recovery actions triggered by the modification of recovery criteria, along with the costs, timing, and priority of any such additional actions. Because recovery plans are not regulatory documents, identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Nothing in a recovery plan should be construed as a commitment or requirement that any Federal agency obligate or provide funds.

Comment (5): The Service should consider whether the recovery criteria are achievable, because including unattainable recovery criteria could render such plans meaningless, or impede other processes under the Act.

Response: The National Marine Fisheries Service and U.S. Fish and Wildlife Service Interim Endangered and Threatened Species Recovery Plan Guidance (2010) emphasizes the development of recovery criteria that are specific, measurable, achievable, realistic, and time-referenced (SMART). The achievable component of SMART criteria implies that the authority, funding, and staffing needed to meet recovery criteria are feasible, even if not always likely. In developing recovery criteria specifically, we attempt to establish criteria that are both scientifically defensible and achievable to the greatest extent possible. At times, however, the feasibility of achieving certain criteria can be, or appear to be, constrained by the particular, difficult circumstances that face a species. Even in such cases, criteria serve to guide recovery actions and priorities for the species. Furthermore, as recovery progresses, periodic reevaluation of the species status through the 5-year review process may reveal that the barriers to achieving certain criteria have been removed or that circumstances or our understanding of the species have evolved. In that event, the Service can revise recovery criteria to ensure that they reflect the strategy most likely to succeed in the goal of recovery.

Comment (6): The Service should consider conservation efforts that have been put into place for the listed species since the previous iteration of the recovery plan, especially where the Service has supported conservation efforts, in formulating recovery criteria that will be established or amended by the revised draft plan.

Response: While section 4 of the Act directs the Service to specifically develop and implement recovery plans, several other sections of the Act and associated programs and activities also provide important opportunities to promote recovery. Information from these programs and activities about the biological needs of the species can inform recovery planning (including the formulation or revision of recovery criteria) and implementation. These conservation efforts have been considered during the development of this and other recovery plans.

Comment (7): The Service should determine whether ongoing species conservation efforts beneficially address one or more of the listing factors set forth in the Act implementing regulations addressing species listings and designation of critical habitat.

Response: All Service decisions that affect the listed status or critical habitat designation of a particular species, including our 5-year review of each listed species, are made by analyzing the five factors described in section 4 of the Act. Such an analysis necessarily includes an assessment of any conservation efforts or other actions that may mitigate or reduce impacts on the species. While our objective with this particular effort was to establish objective, measurable criteria for delisting, conservation actions play a crucial role in determining if and when those criteria have been satisfied.

Comment (8): The Service should be mindful of the impacts that recovery plan criteria can have on the section 7 process of the Act for the regulated community, because the Service and other Federal resource agencies sometimes request that recovery criteria be addressed in biological assessments and other planning processes under the Act addressing listed species.

Response: Recovery plans can both inform, and be informed by section 7 processes of the Act. When revising a recovery plan, existing section 7 consultations may provide helpful information on: recent threats and mechanisms to avoid, minimize, or compensate for impacts associated with those threats; a summarized status of the species; and indication of who important partners may be. Section 7 consultations can inform the need for revised recovery actions, recovery implementation schedule activities, recovery criteria, or species status assessments to provide more comprehensive recovery planning while the species remains listed.

Comment (9): The Service should include the full panoply of current information available for the species in all revised draft recovery plans.

Response: Our recovery planning guidance recommends that recovery planning be supported by compilation of available information that supports the best possible scientific understanding of the species. Although it is not necessary to exhaustively include all current information within the text of the recovery plan, to the extent that this information is specifically relevant and useful to recovery, the recovery plan may summarize such material or incorporate it by reference. Supporting biological information may also be included within a species status assessment or biological report separate from the recovery plan document itself.

Comment (10): The Service should consider whether the existing recovery plan should be revised or replaced in its entirety rather than amended in part.

Response: Under guidance established in 2010, partial revisions allow the Service to efficiently and effectively update recovery plans with the latest science and information when a recovery plan may not warrant the time or resources required to undertake a full revision of the plan. To further gauge whether we had assembled, considered, and incorporated the best available scientific and commercial information into this recovery plan revision, we solicited submission of any information, during the public comment period, that would enhance the necessary understanding of the species' biology and threats, and recovery needs and related implementation issues or concerns. We believe the recovery plan amendment, which targets updating recovery criteria, is appropriate for the species. However, we will also continue to evaluate the accuracy and usefulness of the existing recovery plan with respect to current information and status of conservation actions, and may pursue a full revision of the plan in the future, if appropriate.

Comment (11): The New Mexico Forestry Division has been monitoring Lee's pincushion cactus at Carlsbad Caverns National Park since 2014, funded by the Service under Section 6 (Service 2015; Roth 2014, 2015, 2016 2017, 2018 (in draft)). Hence this information provides the most up-to-date and consistent dataset available for population trends of this cactus, including the response of the species to fire.

Response: The amendment has been edited to acknowledge monitoring of Lee's pincushion cactus by the New Mexico Forestry Division.

Comment (12): To the best of my knowledge there is no data to suggest that fire has positive effects on Lee's pincushion cactus. If you have this information, please cite. It is unclear why the Service would not utilize this most recent dataset to provide information on population trends and impacts of fire.

Response: The Sneed and Lee Pincushion Cacti Recovery Plan states, "Although fires may destroy some plants, the overall effect could be beneficial if competing species are eliminated" (Service 1986). However, the document acknowledges that the effect of fire on the cactus needs to be studied more. We believe the potential effects of fire will be assessed in a subsequent 5-year review or any consideration of delisting the species.

Comment (13): While we have a reasonable understanding of what constitutes suitable habitat for both varieties, it is well known that most rare and endangered cacti occupy only a fraction of the available suitable habitat.

Response: Geographic Information System (GIS) suitable habitat models are going to be created for both varieties. This will help with identifying the core-populations and sub-populations (EO's). The Sneed pincushion cactus model is currently being developed and when it is concluded the information will be dispersed to partners/stakeholders. Monitoring of tracks and sending back negative observations will be critical for improving the model.

Comment (14): It is unclear why no amended downlisting criteria are provided for Sneed's pincushion cactus. Presumably because they are considered sufficient? Please clarify.

Response: The scope of the Agency Priority Performance Goal (APG) process was to develop "quantitative recovery criteria" that will be used for delisting analysis. At this time, we did not find

it necessary to amend the downlisting criteria.

Comment (15): Please cite the source for establishing that 20 years is equivalent to approximately 2 generations for cacti. What is the justification for establishing or locating one additional core population for Lee's pincushion cactus that has to be occupied for only 10 of the 20 years of monitoring? These are long-lived cacti. There is no reason why they would be gone half of that time, whatsoever.

Response: The Sneed and Lee Pincushion Cacti Recovery Plan states: "Most Sneed pincushion cacti bloom after 3-4 years" (Service 1986). Thus, in a 20 year time frame, at most 6 generations could be established. Since this is a long lived cactus, we want monitoring of at least two generations during that 20 year period. For Lee's cactus, the establishment or discovery of one new core population helps with redundancy for the species. If another population is discovered then it must also fulfill Criterion 1, in that it will need a stable or increasing population for at least 10 years. If the population is established (via translocation), we are creating an additional population that may or may not persist, and will have virtually no impact on the naturally established populations. If the other core populations are stable or increasing, the decline of a newly established translocated population should not hinder from delisting because it would not reflect an overall decline of the species.

Comment (16): A 50% occupancy rate would constitute a very serious and unacceptable decline for any core population. Occupancy alone is an insufficient delisting criterion. As written, this could imply that as long as there is one cactus observed, the criterion has been met.

Response: Language was added to the Recovery Plan Amendment to clarify this criterion. Time will be needed to discover or translocate a new "core population" site, which is why only 10 of the 20 years is necessary. If the Lee pincushion cactus core-population is discovered (naturally in the wild) Criterion 1 must apply. However, if the core population is translocated occupancy for 10 of the 20 years is all that is required to fulfill Criterion 2.

Comment (17): Recommendation to replace "abundance" with "stable demographic structure." Abundance is an unreliable (and expensive) indicator of resiliency. See Development of Protocols to Inventory or Monitor Wildlife, Fish, or Rare Plants (USDA/USFS, June 2006, pg. 3-5-3-6) for a comparison of, and recommendations about, these monitoring indicators.

Response: The quantitative recovery criteria is based on best available science using Resiliency, Redundancy, and Representation (3 R's). The 3 R's method looks at the species abundance across the range of the species and whether it can withstand environmental stochasticity. Distribution is another component that is considered to see if sub-populations are geographically separated and can withstand catastrophic events. The species diversity of being geographically separated may have adaptive characteristics that will help a species persist into the future. Resiliency refers to the population size necessary to endure stochastic environmental variation (Shaffer and Stein 2000:308-310). Abundance is well-documented in the literature as a measure of resiliency (Shaffer and Stein 2000, Walpes et al. 2013, Wolf et al. 2015). The 3 R's is the "best available science" that the Service uses in Species Status Assessments and the 3 R's have been defined (Carroll et al. 2010, Wolf et al. 2015).

The citation indicated in this comment is specific to the USDA/USFS, not the U.S. Fish and Wildlife Service. The recovery criteria creates a framework of what is needed for the species recovery. Different agencies may approach monitoring differently, due to numerous reasons, and should not be held to one method only. Consultation will still be necessary for these species by all appropriate agencies. Finally, as public servants we are tasked with making our decisions transparent for the American public so private individuals, who may not have a science background, can understand the process. Abundance is a widely understood term that encompasses a variety of more technical survey methods.

Summary of Peer Review Comments

In accordance with the requirements of the Act, we solicited independent peer review of the draft amendment from local, State, and Federal agencies; academic and scientific groups and individuals; and any other party that may have possessed pertinent information. Peer review was conducted concurrent with the *Federal Register* publication. Criteria used for selecting peer reviewers included their demonstrated expertise and specialized knowledge related to *Coryphantha sneedii* var. *sneedii* (Sneed pincushion cactus) and *Coryphantha sneedii* var. *leei* (Lee pincushion cactus), scientific area or management of habitat of species under consideration, plant conservation biology, botany, genetics, land use or management relative to shortgrass prairies, threats facing this ecosystem, and propagation/reintroduction methods). The qualifications of the peer reviewers are in the decision file and the administrative record for this recovery plan amendment.

In total, we solicited review and comment from five peer reviewers. We received comments from one peer reviewer. The peer reviewer that responded included a representative from an environmental consulting firm. In general, the draft recovery plan revision was well-received by the peer reviewer and garnered positive comments. The reviewer provided additional specific information; we thank the reviewer for these data and we have added the information where appropriate.

We considered all substantive comments, and to the extent appropriate, we incorporated the applicable information or suggested changes into the final revised recovery plan. Below, we provide a summary of specific comments received from peer and partner reviewers with our responses; however, we addressed many of the reviewers' specific critiques and incorporated their suggestions as changes to the final revised recovery plan. Such comments did not warrant an explicit response, and as such, are not addressed here. We appreciate the input from all commenters, which helped us to consider and incorporate the best available scientific and commercial information during development and approval of the final revised recovery plan.

Peer Review Comment (1): Environmental Consultant (Ph.D). Considerations that may be used in the delisting process:

Currently, most cacti populations occur in lands under various agencies management (Department of Defense [DOD], BLM, National Parks Service, and Texas Department of Parks and Wildlife). As a result the species are protected by the implementation of these agencies' Integrated Natural Resources Management Plans (INRMP). These agencies' INRMPs should be reviewed to verify they include sections that address protective measures in benefit of the cacti in question.

Even though not all potential habitat is occupied by the Sneed pincushion cactus, there are ample populations at various sites within the distribution range in favor of the species continued existence.

Variations in population's trends are mostly dictated by natural climate patterns that, at the same time, affect the ecosystem as a whole. It is unlikely that a man-caused impact will significantly threaten the species survival since populations are spatially disconnected.

Fuel loads, at least at Sneed cactus locations, are low and unlike to carry a fire that could impact the cactus. The plants grows in rock crevices in very rough terrain. So fire events do not pose a significant threat. The same assessment apply to concerns of potential impacts by grazing since the sites are mostly inaccessible to cattle. Some agencies do not allow grazing in areas occupied by the species and the DOD has designated Sneed cactus Off Limits to military training.

Reduction of population numbers by trespassing collectors is much lower than for other species since Sneed and Lee pincushion cacti are less attractive when compared to other more showy succulents. Additionally, seeds are commercially available so cacti enthusiasts can grow the plants without trespassing onto natural locations.

Some Sneed cactus populations are adjacent to urban areas of El Paso, TX and somewhat exposed to trampling by hikers in the Franklin Mountains.

Finally, additional genetic studies may elucidate the affinity among the taxa in the Sneed cacti complex and their taxonomic placement.

Response: We acknowledge the breadth of considerations compiled by the peer reviewer needed for species recovery and delisting. While this information has not resulted in any changes to the recovery criteria in the final recovery plan amendment, these considerations will be taken into account at the time Sneed and Lee pincushion cactus are considered for delisting.