

**Recovery Plan for *Echinocerus fendleri* var. *kuenzleri* (Kuenzler Hedgehog Cactus)**

**Original Approved:** March 28, 1985

**Original Prepared by:** Reggie Fletcher, U.S Department of Agriculture

**DRAFT AMENDMENT 1**

We have identified best available information that indicates the need to amend recovery criteria for this species since the Kuenzler Hedgehog Cactus (*Echinocerus fendleri* var. *kuenzleri*) 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 13 (U.S. Fish and Wildlife Service (Service) 1985: 13).

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

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Approved: \_\_\_\_\_ DRAFT \_\_\_\_\_ Date: \_\_\_\_\_  
Regional Director, Region 2  
U.S. Fish and Wildlife Service

**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 A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification.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), Natural Heritage New Mexico, New Mexico Energy, Minerals and Natural Resources Department, New Mexico State Land Office, U.S. Forest Service (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**

The 1985 Recovery Plan was developed according to guidance at the time, which included biological factors, conservation measures, and threats. However, the 1985 Recovery Plan does not include delisting criteria and does not conform to all current standards and guidance for recovery planning (Service 1985: entire).

#### **Synthesis**

In 2017, we completed a Species Status Assessment for Kuenzler hedgehog cactus (Service 2017: entire). We determined that Kuenzler hedgehog cactus has good current and future viability (Service 2017: 28–43). We identified three populations: North Sacramento Mountains, South Sacramento Mountains, and Guadalupe Mountains. Within these populations most individuals occur at three core sites (Fort Stanton, Elk, and Texas Hills). The current overall condition of the North Sacramento Mountains population is high, and moderate for the South Sacramento Mountains and Guadalupe Mountains populations (Service 2017: 27). We believe that the three populations have a sufficient number of individuals, are broadly distributed across

their ranges, with adequate connectivity to have a low risk of extinction at the current time (Service 2017: 30). Based on this assessment we reclassified Kuenzler hedgehog cactus from endangered to threatened (Service 2018: entire).

### **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 Kuenzler hedgehog cactus may no longer meet the definition of an endangered or threatened species and 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 abolish the downlisting criteria included in the 1985 Recovery Plan (Service 1985: 13) and introduce delisting criteria for the Kuenzler hedgehog cactus as follows:

#### **Downlisting Recovery Criteria**

##### Current recovery criteria

The objective of this recovery plan is to protect and manage Kuenzler hedgehog cactus in order to secure and maintain a wild population level of 5,000 individual plants for a period of 5 consecutive years. Once this is accomplished, downlisting to threatened status can be considered. The major strategy for achieving this objective is the establishment of a comprehensive trade management plan for all cacti and the establishment and implementation of Service policy regarding commercial, artificial propagation for cacti used in trade.

The downlisting of Kuenzler hedgehog cactus is dependent upon the establishment of more than one self-sustaining population and removal of the collecting pressure which can be facilitated by the introduction of 10,000 artificially propagated plants into the commercial market. If Service policy has not been set by January 1986, or if Service policy does not allow for the provision of artificially propagated plants into the commercial market, then less cost-effective strategies may have to be implemented, i.e., permanent, onsite law enforcement personnel will have to be provided or other measures will be identified and considered.

These criteria would include the management of the habitat and the establishment of a program to curtail collecting through enforcement and through a commercial artificial propagation program.

Because of the small range and naturally limited habitat of this cactus, a review of its status will be made once downlisting criteria have been met, to determine delisting requirements (Service 1985: iii).

Amended recovery criteria

The criteria for downlisting Kuenzler hedgehog cactus are abolished as the species has been reclassified to threatened status.

**Delisting Recovery Criteria**

Current recovery criteria

None

Amended recovery criteria

The Kuenzler hedgehog cactus will be considered for delisting when:

*Delisting Criterion 1: Resiliency*

1. Demonstrate a stable or increasing trend in abundance for the Fort Stanton, Elk and Texas Hills subpopulations over a 20-year period.

Justification: This criterion addresses stochastic threats like wildfire and climate change that may affect population demographics over long time periods. This will be based on periodic demographic trend monitoring and analysis implemented under the recovery actions.

The Fort Stanton, Elk, and Texas Hills subpopulations are core sites that include the majority of known individuals and represent the geographical, morphological, and genetically diverse range of Kuenzler hedgehog cactus. Species persistence depends on stable or increasing demographic trends with recruitment of new individuals equaling or exceeding mortality. Trend monitoring 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 Kuenzler hedgehog cactus, grounding the criteria in a biologically relevant timeframe. Observing the populations 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 the populations are performing such that recovered status is likely to be maintained after delisting. We expect population trends to be stable or growing as populations progress toward recovery, although population declines could occur for one or a few years during the 20-year period.

*Delisting Criterion 2: Redundancy*

2. Maintain a minimum of three geographically separated core sites over a 20-year period.

Justification: The redundancy criteria addresses the catastrophic threats to the species such as climate change, fire, and parasitism. Fort Stanton, Elk, and Texas Hills are core sites because as they include the majority of known individuals and represent the geographical, morphological, and genetically diverse range of Kuenzler hedgehog cactus.

*Delisting Criterion 3: Representation*

- 3a. Maintain genetic diversity within all core sites 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 all existing subpopulations (EOs) outside of the core sites over a 20-year period, 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. We are most concerned with pollination as Kuenzler hedgehog cactus is an outcrossing species that is pollinated by bees. 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 Kuenzler hedgehog cactus population through Element Occurrences 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 sites 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 Kuenzler hedgehog cactus 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 construction and development. This plan will keep the species considered in decision-making and avoid future threats of extinction. Threats, such as 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 agency's jurisdiction. The HMP should be incorporated into regulatory agency management plans. By incorporation into agency management plans adequate protection is ensured that Kuenzler hedgehog cactus will 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, such as delisting, 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 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 address all threats, which have been lessened 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 Kuenzler hedgehog cactus 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 sites (Fort Stanton, Elk and Texas Hills), 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 site by ensuring that one or more additional core sites (Fort Stanton, Elk and Texas Hills) persist. No loss of the three core sites 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 Kuenzler hedgehog cactus 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 subpopulations 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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