

Recovery Plan for *PEDIOCACTUS BRADYI* (Brady Pincushion Cactus)

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DRAFT AMENDMENT

We have identified information that indicates the need to amend the recovery criteria for this species. 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, and document the completion of recovery actions that have met the delisting criteria. We present the proposed modification as an appendix that supplements the recovery plan, superseding pages 19-34 of the recovery plan.

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

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

BACKGROUND INFORMATION

We should consult recovery plans frequently, use them to initiate recovery activities, and update recovery plans 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 A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification.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. We may amend a recovery plan when, among other possibilities: (1) the current recovery plan is out of compliance with regard to statutory requirements; (2) new information has been identified that necessitates new or refined recovery actions and/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 the recovery plan needs significant plan improvements, 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) emphasizing refined and/or prioritized recovery actions, (2) refining recovery criteria, or (3) adding a species to a multispecies or ecosystem plan. Therefore, we can use the amendment process to balance resources spent on modifying a recovery plan against those spent on managing implementation of ongoing recovery actions.

In this recovery plan, we are adding delisting criteria for Brady pincushion cactus, as well as defining what constitutes a population and what constitutes disturbance to habitat. As discussed below, we did not incorporate delisting criteria into the existing recovery plan due to a lack of census data for the plant at the time we signed the recovery plan. Quantifiable delisting criteria are necessary to determine when we have met the recovery goals for Brady pincushion cactus and can consider delisting the species. In previous documents, including the listing rule (44 FR 61784) and the 1985 recovery plan (USFWS 1985), we did not define populations or what constitutes habitat disturbance.

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

We looked at existing quantifiable recovery criteria for similar species in similar habitats to help develop these recovery criteria. We analyzed what recovery actions our partners have taken since the development of the original plan. We also analyzed long-term monitoring data provided by the Arizona Strip BLM office, as well as monitoring data the United States Geological Survey (USGS) in Henderson, Nevada compiled and synthesized (Shryock *et. al.* 2014). Additionally, we analyzed survey data and propagations studies conducted by The Arboretum at Flagstaff (Haskins and Murray 2017).

Our analysis of the 1985 recovery plan (USFWS 1985) and the listing rule (44 FR 61784) indicated that neither population nor habitat disturbance were defined for this species. For this amendment and managing for the Brady pincushion cactus into the future, we are using NatureServe guidelines for delimiting plant populations (NatureServe 2004) based on the proximity of each location to one another. We considered locations within two kilometer (km) of each other and suitable habitat in between them to be a single population due to the presence of stable, contiguous, and suitable habitat between each location. Plant locations that were greater than two km from each other with persistently unsuitable habitat in between them, we considered separate populations (NatureServe 2004). Based on these criteria, we believe that there are seven populations of Brady pincushion cactus. We defined disturbance as the destruction of biological crust and modification of the microwatersheds, as defined by Wallace and Romney (1981), that negatively impacts individuals, the seedbank, and the successful re-establishment of Brady pincushion cactus.

The downlisting criteria in the existing recovery plan include a quantifiable criterion of having permanent protection of 75 percent of the known habitat according to the steps outlined in the plan. We did not incorporate delisting criteria into the existing recovery plan due to a lack of census data for the plant at the time we signed the recovery plan.

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) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

Recovery Criteria

The prime objective of this recovery plan is to reduce taking from the wild and to manage and protect the essential habitat of Brady pincushion cactus so that we can sustain populations at a level where we can remove the species from the Federal Endangered Species List.

The criterion for downlisting to threatened status is permanent protection of 75 percent of the known habitat according to the steps outlined in this plan.

Synthesis

Our partners have implemented or continue to implement many of the actions described in the step-down outline and narrative on pages 19-34 of the 1985 recovery plan. Since the finalization of the recovery plan, partners have located a previously unknown population of Brady pincushion cactus in previously unsurveyed but known suitable habitat. In addition, DOI removed from mineral exploration over one million acres of land surrounding the Grand Canyon watershed in a 2012 Secretarial Order (DOI 2012), thus removing one of the main threats to the cactus. The Bureau of Land Management (BLM) designated Areas of Environmental Concern (ACEC) around all populations of Brady pincushion cactus, thus offering increased management and protections from other threats, such as off-highway vehicle (OHV) use. The USGS in Henderson, Nevada compiled several years’ worth of monitoring and demographic data gathered by the Arizona Strip BLM (Shryock *et. al.* 2014). Shryock *et. al.* (2014) used these data to look at the long-term vulnerability of Brady pincushion cactus to estimate the species’ sensitivity to variable climates resulting from future climate change. Haskins and Murray (2017) conducted surveys of suitable habitat on BLM land and collected seeds for propagation studies in order to determine the efficacy of growing cacti in a greenhouse to supplement wild populations. Those surveys identified a new location of Brady pincushion cactus southwest of the southern-most known location along Marble Canyon on BLM-administered lands (Haskins and Murray 2017). It is possible that the downlisting criterion to protect 75 percent of the habitat may already be complete; further analysis is required. Similarly, many recovery actions in the step-down outline have been addressed. We also need to complete recovery actions still in process, such as studies initiated in the last few years.

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 Brady pincushion cactus no longer meets the definition of an 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, sub-

species, or DPS) that is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

We provide both downlisting and delisting criteria for the Brady pincushion cactus, which will supersede those included in the Brady Pincushion Cactus (*Pediocactus bradyi*) Recovery Plan, as follows:

Definitions

Population: Groupings or single plants within 2 km of each other within areas of suitable habitat.

Disturbance: Destruction of the biological crust and modification of microwatersheds (as defined by Wallace and Romney [1981]) that negatively impacts individuals, the seedbank, and the successful re-establishment of the species.

Downlisting Recovery Criteria

As described above, the criterion for downlisting to threatened status is permanent protection of 75 percent of the known habitat according to the recommendations in this plan. We are amending the downlisting criterion to include implementing actions in order to determine when the plant should be downlisted.

Implementing Actions for Downlisting Criterion

- 1 **Inventory the amount of Brady pincushion cactus habitat that has permanent protection in place** (addresses all five-factor threats). We must compare the amount of cactus habitat known to the amount of habitat that has had permanent protections put in place. The BLM has designated most, if not all, of the habitat on BLM-administered lands as an ACEC, providing extra management protections to the cactus in perpetuity. We need to add the amount of habitat existing on Tribal land to the cumulative total of habitat in order to determine if the ACEC accounts for 75 percent of the known habitat for Brady pincushion cactus.
 - 1.1 **Conduct census of land ownership and habitat protections implemented.** Compile maps of landownership and determine what special management protections have been implemented to permanently conserve Brady pincushion cactus habitat. We must define what constitutes permanent protection and what actions can be taken, or have been taken, to ensure permanent protection for the cactus’ habitat.
 - 1.2 **Propose downlisting of Brady pincushion cactus.** If 75 percent of the cactus’ habitat has been permanently protected, then we should propose downlisting to threatened.

Delisting Recovery Criteria

We did not establish delisting (recovery) criteria for Brady pincushion cactus in the recovery plan. We will add the amended recovery criteria, and their associated Implementing Actions, to the recovery plan.

Amended recovery criteria

The delisting criteria for Brady pincushion cactus are:

1. Maintain populations at a level that demonstrates stable or increasing plant abundance and maintain the current distribution of locations within each population. Plant abundance (measured by the number of plants) may fluctuate within locations and populations, but the defined populations should be stable or increasing over a consecutive 10-year period.
2. Ensure no more than 20 percent of the occupied Moenkopi shale and sandstone habitat (as defined in the Recovery Plan and final rule to list the species: 44 FR 61784) within each of the populations is disturbed over a consecutive 10-year period.

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 ESA (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. We publish our final decision in the *Federal Register*.

Implementing Actions for Recovery Criteria

- 1 Conserve known extant Brady pincushion cactus populations and their habitat** (addresses all five-factor threats). The primary threat to the cactus is the loss of habitat, mostly associated with mining activities. Surveys have located the cactus only in Kaibab limestone chips overlying soil derived from Moenkopi shale and sandstone outcrops in northern Coconino County, Arizona. Preserving and enhancing these soils and habitat in this area is essential to the conservation of this species.
 - 1.1 Manage for and enhance habitat using available mechanisms like land acquisition programs, conservation agreements, management agreements, etc.** Working in partnership with the BLM, we recommend using BLM's administrative processes to amend ACEC plans to provide adequate protection to cactus habitat from mining activity. ACECs provide special management for habitat and the plants and wildlife within them. Work with the Navajo Nation to develop a habitat management plan to reduce threats to populations on tribal lands.
 - 1.2 Maintain all Brady pincushion cactus populations.** Working in partnership with the BLM and Navajo Nation, we should use long-term management agreements, management plans, land designations, and other potential methods to ensure that all populations of cacti have stable or increasing plant numbers for 10 consecutive years to ensure populations are established and stable or increasing in size.
 - 1.3 Reclaim Disturbed Brady pincushion habitat.** For a location to continue to count as Brady pincushion cactus habitat, the responsible land manager must reclaim any disturbed site through: 1) the collection and planting of cacti and associated native plant seeds and plants in disturbed areas using standard habitat restoration

techniques, 2) transplanting, following tested protocols, of cactus individuals that cannot be avoided by disturbance, 3) collection of cactus seed, using approved techniques, to be saved for conservation in a designated seed storage facility, and 4) monitoring for 10 consecutive years to ensure populations are established and stable or increasing in size.

- 1.4 Continue to monitor Brady pincushion cactus populations** to determine long-term population trends with a minimum of 10 years of consecutive monitoring. All large populations should be monitored annually in order to establish a trend and determine whether or not cactus populations are stable or increasing in order to delist the species. Populations should be stable or increasing over a 10-year period beginning with the implementation of the recovery plan and this implementation strategy.
- 1.5 Develop a standardized monitoring plan and protocol.** In partnership, we need to develop a cohesive plan for acquiring the quality and quantity of information required to detect population trends for this species. The monitoring plan should provide information regarding both plant abundance and population trend as well as habitat conditions. Monitoring protocols should include randomized monitoring plots across an area sufficient to detect population trends. Additionally, monitoring should include methods that will determine seedling survivorship. We should use results from past monitoring efforts to inform improved monitoring protocols with the aim of facilitating consistency of data collection and analysis on a rangewide basis. Plant abundance and population trend will help determine if the cactus is remaining stable or increasing as monitoring continues over time.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

No additional site-specific recovery actions are necessary for this species.

COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS

No additional site-specific recovery actions are necessary for this species.

LITERATURE CITED

- Department of Interior (DOI). 2012. Record of Decision Northern Arizona Withdrawal Mohave and Coconino Counties. Signed January 9, 2012. 24pp.
- Haskins, K.E, and S. Murray. 2017. Conservation of a rare cactus (*Pediocactus bradyi*) through surveying and seed collection. The Arboretum at Flagstaff. 12pp.
- NatureServe. 2004. A habitat-based strategy for delimiting plant element occurrences: guidance from the 2004 working group. October 2004. 15pp.
- Shryock, D.F., T.C. Esque, and L. Hughes. 2014. Population viability of *Pediocactus bradyi* (Cactaceae) in a changing climate. *American Journal of Botany* 101(11): 1944-1953.
- Wallace, A. and E.M. Romney. 1981. The role of pioneer species in revegetation of disturbed desert areas. *Great Basin Naturalist Memoirs* 4: 31-33.