

Recovery Plan for *Pilosocereus robinii* (Key Tree-cactus)
<https://www.fws.gov/verobeach/MSRPPDFs/KeyCactus.PDF>

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DRAFT AMENDMENT 1

We have identified best available information that indicates the need to develop recovery criteria for *Pilosocereus robinii* (Key tree-cactus) since the recovery plan was completed. In this proposed modification, we synthesize the adequacy of the existing criteria, show amended recovery criteria, and provide the rationale supporting the proposed recovery plan modification. The proposed modification is shown as an addendum that supplements the South Florida Multi-Species Recovery Plan (MSRP; U.S. Fish and Wildlife Service [Service] 1999), superseding only the recovery criteria on page 4-1119. Recovery plans are a non-regulatory document that provide guidance on how best to help recover species.

**For
U.S. Fish and Wildlife Service
Region 4
Atlanta, Georgia**

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METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The proposed amendments to the recovery criteria are based on the recovery plan, the current five-year review (Service 2010), and recent studies with the species. These were discussed with Service biologists and managers in the South Florida Ecological Services Field Office in order to develop the delisting criteria for the Key tree-cactus. The amendment to this recovery plan is based on the most recent information regarding the species and current threats to the species.

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) have also affirmed the need to frame recovery criteria in terms of threats assessed under the five threat factors (ESA 4(a)(1)).

Recovery Criteria

The MSRP only provides downlisting criteria, and they can be found on page 4-1119.

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Synthesis

The Key tree-cactus is a member of the cactus family (Cactaceae). It is a long-lived tree-like columnar cactus growing to 10 meters (m) tall (32.1 ft.). The Key tree-cactus is known in the U.S. only from Monroe County, Florida in the Florida Keys. It is a member of the rare and declining tropical hammock community. Populations are extant on Upper and Lower Matecumbe Keys, Long Key, and Big Pine Key (Adams and Lima 1994, Service 1999, Florida Natural Areas Inventory [FNAI] 2009, Service 2010).

The distribution of Key tree-cactus has decreased over the past 200 years as the Florida Keys have been transformed by commercial and residential development (Factor A; Service 1999). The historical range of Key tree-cactus included the entire expanse of the Florida Keys, from Key West to Key Largo (Adams and Lima 1994). Records exist for populations on Key West, Boca Chica Key, Big Pine Key, Long Key, Lower Matecumbe Key, Upper Matecumbe Key, Windley Key, and Key Largo (Adams and Lima 1994).

Key tree-cactus has experienced an overall loss of approximately 90 percent of all plants from 1994 to 2018, and seedling recruitment has been rare or non-existent for the past decade. While six (6) populations are either protected by agreements or located on publicly-owned conservation land, most populations have experienced a precipitous decline over the past 15 years. Populations formerly found on Key West, Key Largo, Windley and Boca Chica keys, have been extirpated (FNAI 2009, Service 1999).

As of 2018, eight (8) natural and two (2) introduced populations are extant on six (6) islands of the Florida Keys. Extant wild populations are located on Big Pine Key, Long Key, Lower Matecumbe Key, and Upper Matecumbe Key (Adams and Lima 1994, FNAI 2009, Maschinski et al. 2009, Service 1999). Reintroduction efforts since 2010 have returned the species to Key Largo and Windley Key.

Storm surge from Hurricanes Wilma in 2006 and Irma in 2018 inundated populations throughout the Keys. Soil samples from multiple Key tree-cactus sites indicated a positive correlation between high soil salinity and areas of high cactus mortality after Hurricane Wilma (Maschinski et al. 2009).

The threat of overutilization for commercial or recreational purposes (Factor B) was identified at the time of original listing in 1984 (49 FR 29234). Key tree-cactus is vulnerable to unlawful exploitation and collection and removal of plants from any of the protected areas for commercial or recreational reasons would be detrimental to the species. All sites with Key tree-cactus should be monitored for possible illegal collection activities.

Sea-level rise (SLR) threatens to first modify and then eliminate the habitat of Key tree-cactus over the next 100 years (Factor E; The Nature Conservancy [TNC] 2008, Ross et al. 2009). Documented habitat changes toward halophyte (salt-tolerant) dominated plant communities suggest that SLR may have already begun to modify habitats in the Florida Keys. Given the National Oceanic and Atmospheric Administration (NOAA; 2017) projections of SLR over the next century, it is likely the effects of salt-water intrusion will continue and will increasingly have negative impacts on Key tree-cactus and its habitat.

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 protections afforded by the Act are no longer necessary and Key tree-cactus 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 an endangered species to a threatened species. The term “endangered species” means any species (species, sub-species, or DPS) 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.

Revisions to the Lists, including delisting or downlisting a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made “solely on the basis of the best scientific and commercial data available.” Thus, while recovery plans provide important guidance to the Service, States, and other partners on methods of minimizing threats to listed species and measurable objectives against which to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species’ status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan, which triggers rulemaking. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

We are providing delisting criteria for the Key tree-cactus, which will supersede the downlisting criteria included in the MSRP.

Delisting Recovery Criteria

The Key tree-cactus will be considered for delisting when:

1. At least 20 populations exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes.
2. Populations (as defined in criterion 1) occur in tropical hardwood hammock habitat and are distributed across the historical range of the species. (Factor A)

3. Populations (as defined in criterion 1) must be protected via a conservation mechanism and/or managed such that enough suitable habitat is present for the species to remain viable for the foreseeable future. (Factors A, D, and E)

Justification

The recovery criteria provide standards to address the resilience (size) of existing populations (Criterion 1), their distribution (representation) across the species' historical range (Criterion 2), and redundancy of the species in terms of a sufficient number of resilient populations to withstand stochastic events such as hurricanes (Criteria 1, 2, and 3).

The decline in the number of individual plants in a population can occur quickly, therefore these criteria are designed to more specifically track the stability and resilience of the species at the population (site-level). Narrow ranging endemic species that re-sprout from root-stocks following regular natural disturbances such as fire, rather than relying solely on regeneration from the soil seed bank, and/or are long-lived are less vulnerable to extirpation by stochastic events and demographic fluctuations, such that populations numbering in hundreds of plants are resilient. The establishment of multiple new populations within the species' historical range provides a necessary redundancy and distribution to support recovery for this narrow-ranging endemic species, and the capacity for the species to persist in the face of stochastic events such as storm surge (Factor E).

Key tree-cactus has been successfully propagated ex-situ and has been introduced into suitable habitat within its historical range. The recovery criteria support the establishment of additional populations to improve species redundancy and restore it throughout its historical range (Criterion 3 – a minimum of 20 resilient populations) (Service 1999). Re-introductions increase population numbers in suitable habitat in order to increase the species' resiliency and redundancy.

The recovery criteria address those factors necessary for the species' recovery. Threats under Factor A and E include the documented loss and impacts to the species' habitat from development, storm surge, SLR, and the resulting increased salt water inundation of the species' habitat.

The existing Federal and State regulations designed to protect endangered and threatened plant species provide protections in collection and transport but inadequately protect listed plant species from the major threat of habitat loss. The threats to Key tree-cactus under Factor D are addressed with the recovery criteria to develop and implement mechanisms (such as cooperative agreements) for protecting Key tree-cactus habitat, and through the effective management of suitable habitat on already protected lands. These criteria address the need to assure long-term persistence and protection of tropical hardwood hammock habitat.

The recovery criteria are measurable and continue to address the existing framework and strategy of the active recovery plan in enhancing populations and preventing further degradation of existing habitat.

Achievement of Criteria 1, 2 and 3 will ensure that at least 20 robust populations are adequately protected and sufficiently managed to maintain and/or increase population resiliency, redundancy, and representation throughout the historical range.

Rationale for Amended Recovery Criteria

The existing criteria for Key tree-cactus in the MSRP (Service 1999) lacked delisting criteria and included only downlisting criteria for the species. With these proposed amendments, delisting has been clearly defined with measurable, objective criteria in keeping with the recovery strategy and goals outlined in the MSRP. These criteria address what is necessary to ensure resiliency, redundancy, and representation by addressing factors that threaten Key tree-cactus. In achieving these criteria, we expect Key tree-cactus to have a low probability of extinction for the foreseeable future and have robust, stable populations needed for long-term recovery. We will work together with our partners to strategically and efficiently implement the new criteria.

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