

Recovery Plan for the endangered *Asimina tetramera* (Four-petal pawpaw)
<https://www.fws.gov/verobeach/MSRPPDFs/Fourpetal.PDF>

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DRAFT AMENDMENT 1

We have identified the best available information that indicates the need to develop recovery criteria for *Asimina tetramera* (four-petal pawpaw) since the recovery plan was completed. In this proposed modification, we synthesize the adequacy of the existing recovery 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) by adding delisting criteria which were not developed at the time the recovery plan was completed. The recovery objective and the step-down outline are described on pages 4-807 to 4-811 of the MSRP. 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, GA**

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METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The proposed amendments to the recovery criteria are based on recent studies involving the species and its distribution and information contained in the 2009 5-year review. The most recent and best available information was synthesized by Service biologists and managers in the North Florida Ecological Services Office and South Florida Ecological Services Field Office in order to develop the delisting criteria for the four-petal pawpaw.

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 listing factors.

Recovery Criteria

The MSRP only provides downlisting criteria, and they can be found at page 4-807 of the document (<https://www.fws.gov/verobeach/MSRPPDFs/Fourpetal.pdf>).

Synthesis

The four-petal pawpaw was listed as endangered in 1986 (51 FR 34419) primarily due to habitat loss attributed to commercial and residential development along with successional changes to habitat. Population fragmentation, continued urban development, fire suppression and nonnative species are all factors of significant concern to its continued existence (Service 1999; Gann et al. 2002). It is characterized as critically imperiled in South Florida (Gann et al. 2002) and is believed to be declining (Service 1990; Cox pers. comm. 2018). Information obtained from the listing rule, the recovery plan, and the last 5-year review were used in this synthesis.

The four-petal pawpaw can be found in sand pine scrub habitat in the coastal dune system of limited areas of Martin and Palm Beach Counties in southeast Florida (Kral 1960; Austin and Tatje 1979; Service 1999). The remaining four-petal pawpaw populations are declining due to further loss of habitat and may be characterized as existing on fragmented parcels within the historical range. While the four-petal pawpaw was historically documented in sand pine scrub areas of the south-central Atlantic Coastal Ridge of coastal Martin and northern Palm Beach counties, much habitat for the species has been destroyed or converted (Kral 1960; Service 1999; Florida Natural Areas Inventory (FNAI) 2000), and it is now found in a much smaller area from north of Palm Beach Gardens to the Savannas Preserve State Park in Martin County (Cox pers. comm. 1996a; Service 1999; Gann et al. 2002).

The remaining populations of four-petal pawpaw occur within a narrow region of sand pine scrub habitat fragments that in 2018 included 15 sites – 11 public and 4 private sites (Service 1999; Gann et al. 2002; Cox pers. comm. 2018). Current information in 2018 shows four (4) of the 15 existing sites (27 percent) exist on private lands: three (3) in Martin County and one (1) in Palm Beach County (Cox pers. comm. 2018). Four-petal pawpaw occurred on approximately 26-27 historically known sites (Peterson 2008; Service 2009).

The influence of climate change and sea level rise, as well as stochastic events (storms) on the four-petal pawpaw will likely be increasing threats in the years to come (Service 2009). The sand pine scrub habitat on which the four-petal pawpaw depends is globally imperiled, and where found, it presents a challenge to manage the property to benefit the species, especially when on or in close proximity to private lands.

The four-petal pawpaw requires prescribed fire and active land management practices to ensure successful conservation and recovery of the species. The species can be found in open areas as well as mature areas characterized by a closed canopy (Cox pers. comm. 1997).

As with other similar Florida species in the coastal strand and along the Atlantic coastal ridge, the four-petal pawpaw can be outcompeted by invasive exotic species such as Brazilian pepper (*Schinus terebinthifolius*), rosary pea (*Abrus precatorius*), guinea grass (*Panicum maximum*), and natal grass (*Melinis repens*) (Service 2009). Its presence on public lands helps to ensure that the

four-petal pawpaw will not be lost to development in those areas, but habitat degradation will still occur without active management (i.e., prescribed fire, nonnative species management, and limits on herbicide applications) on those sites. Cox (2006) observed that four-petal pawpaw plants on at least two (2) sites had been negatively affected by herbicide application. On the privately owned sites, suitable habitat has not been maintained and fire has been suppressed to protect adjacent development (Peterson 2008; Service 2009). Feral hogs on public or private lands can present additional negative impacts to four-petal pawpaw, by degrading available habitat. Hog control efforts on these sites are sporadic and subject to limited funding.

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 the four-petal pawpaw 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*.

Herein, we provide delisting criteria for the four-petal pawpaw, which will supersede the downlisting criteria in the MSRP.

Delisting Recovery Criteria

The four-petal pawpaw will be considered for delisting when all of the following conditions have been met:

1. At least 25 populations exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes. (Factor A)
2. Populations (as defined in criterion 1) occur in coastal sand pine scrub and are distributed across the historical range of the species. (Factor A, E)
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. (Factor A, D, E)

Justification

The amended recovery criteria address Factors A, D and E. Over-collection of this species does not appear to be an issue, and no disease or predation concerns have been identified; therefore, Factors B and C are not relevant to the four-petal pawpaw.

When this species was listed in 1986, the destruction of its habitat for commercial and residential construction and through successional changes in its habitat were the primary factors associated with the listing of the species (Factor A). These factors and whether prescribed fire can still be used in the urban interface remain the primary threats to the species' survival and recovery over the long term. Several of the above-mentioned recovery criteria cumulatively address the protection and proper maintenance of sand pine scrub habitat to benefit the four-petal pawpaw. Extensive restoration efforts may be needed at several specific sites to sustain populations of this plant. The establishment of additional four-petal pawpaw populations on conservation lands within the species' historical range would increase representation and resiliency, thereby reducing the threats of invasive exotic species, fire suppression, and severe storm events.

Four-petal pawpaw is extant on 15 sites (down from the previously documented 21 sites and historically estimated 26-27 sites (Service 2009)) along the coastal strand of Martin and Palm Beach counties; these areas, outlined in delisting criterion 1, are managed partly for conservation. Eleven (11) of these sites are located on state or federal conservation land, and one is a county park. The remaining four (4) sites are located on private lands, one of which appears to have effective management strategies to help ensure stable, self-sustaining populations. From 1999 to the present, not all public and private sites have been consistently managed to maintain four-petal pawpaw habitat; this management objective needs to be met in order for the species to be considered for delisting (Service 1999). The proposed recovery criteria above reflect the best available and most updated information available on the species and its habitat. Recovery actions, such as population monitoring and habitat restoration, are ongoing at eight (8) of these sites.

The species may have lost significant genetic diversity because of population losses, genetic bottlenecks, and population isolation. For example, Cox (2014) and Loring et al. (2003), reported that a site with 22 plants on private property was destroyed. Unfortunately, plants on

this site possessed seven unique alleles that had not been found on any other site. The low population numbers are of significant concern because they may not be sufficiently large to withstand stochastic events (resiliency). The species narrow geographic range, renders all populations vulnerable to a single catastrophic event, such as a hurricane (redundancy). Population numbers may also be insufficient to withstand catastrophic events. As such, populations may require specific habitat management or augmentation to establish populations of adequate size (resiliency). 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 more resilient.

Conservation areas that support four-petal pawpaw, should be evaluated in greater detail to ensure that the species is regularly monitored (FNAI 1988) and that management is addressing further habitat loss, degradation, and fragmentation (Factors A, D and E; Service 1999). To achieve recovery, management plans for sites that support four-petal pawpaw must include plans for fire management, nonnative species control, and other habitat restoration as needed. Annual monitoring should be established and age structure determined in order to show that sites host hundreds of plants at various ages, indicating a self-sustaining population (Service 1999). If private lands that contain the four-petal pawpaw become available for purchase, efforts should be made to secure those properties for conservation. Efforts to augment known populations or to introduce the four-petal pawpaw at other sites within the historical range will likely be required to ensure the long-term survival of the species (Gann et al. 2002).

Rationale for Amended Recovery Criteria

The existing criteria for four-petal pawpaw on pages 4-807 to 4-811 in the MSRP (Service 1999) (https://ecos.fws.gov/docs/recovery_plan/sfl_msrp/SFL_MSRL_Species.pdf) included only downlisting criteria. 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 the species. In achieving these criteria, we expect four-petal pawpaw 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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