**Recovery Plan for *Banara vanderbiltii* (Palo de Ramón)**
U.S. Fish and Wildlife Service (USFWS). 1991. *Banara vanderbiltii* Recovery Plan. U.S. Department of the Interior, Fish and Wildlife Service, Southeast Region, Atlanta, GA. 22 pp.

**Original Approved:** March 15, 1991
**Original Prepared by:** U.S. Fish and Wildlife Service

## AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for palo de Ramón (*Banara vanderbiltii*) since the recovery plan was completed. In this modification, we synthesize the adequacy of the existing recovery criteria; show amended recovery criteria, and the rationale supporting the recovery plan modification, and additional locations for establishing new viable populations. The modification is shown as an addendum that supplements the recovery plan, superseding only Part II A page 9 of the recovery plan. Recovery plans are a non-regulatory document that provides guidance on how best to help recover the species.

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

**Approved:** Franklin J. Arnold III
Acting **Regional Director, U.S. Fish and Wildlife Service**

**Date:** 9/24/19

## METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The amendments to the recovery criteria are based on recent studies with the species and the information contained in the 2014 5-year review (USFWS 2014). This information was discussed with U.S. Fish and Wildlife Service (Service) biologists and managers in the Caribbean Ecological Services Field Office (CESFO) in order to develop the delisting criteria for palo de Ramón.

## 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**

See previous version of criteria in *Banara vanderbiltii* Recovery Plan on page 9.

**Synthesis**

The most recent 5-year review for palo de Ramón was finalized by the Service in January 2014, and it summarized the information that was gathered since the plant was listed on January 14, 1987 (USFWS 2014).

Currently, only three (3) natural populations of this species are known to occur (PRDNER 2016). These natural populations consist of approximately 39 individuals on Las Piedras del Collado in Salinas (also known as Las Tetas de Cayey), 2 individuals on Finca Tres Vidas in Aibonito; and 14 individuals on Río Lajas, a private property within the municipality of Dorado (known as La Virgencita site) (PRDNER 2016). Las Piedras del Collado has been a designated natural reserve since September 1, 2000, when the Commonwealth of Puerto Rico approved Law No. 283-2000, known as "*Ley para designar el área de los montículos de las Piedras del Collado como Reserva Natural*" (Law to designate Las Piedras del Callado as Natural Reserve). The purposes of this law are to control urban and tourism development in the area and to protect and conserve the geological formation of Las Tetas de Cayey and the surrounding forested areas. Under the Law No. 283-2000, the Puerto Rico Department of Natural and Environmental Resources (PRDNER) designated as natural reserve approximately 19.4 acres (7.86 hectares), including the geological formation and a strip of forest around it (DRNA 2004). The Finca Tres Vidas is private land managed for conservation by Para La Naturaleza of the Puerto Rico Conservation Trust. These two sites are within volcanic substrate in southern and central part of Puerto Rico, respectively. The Río Lajas population occurs within karstic substrate in northern part of the island. The species was also known to occur in the municipalities of Cataño and San Juan. However, these populations are believed to be extirpated due to urban development (D. Kolterman and J. Chinea, UPRM, unpubl. data, 2013). On April, 26, 2018, CESFO staff, in collaboration with José Sustache, PRDNER Botanist, visited the Río Lajas site (La Virgencita), to conduct post hurricane assessment of the tree palo de rosa (*Ottoschulzia rhodoxylon).* We found only 3 individuals of palo de Ramón (1 adult and 2 saplings) (J. Ríos personal observation, 2018). The site was severely impacted by the Hurricane María; and defoliation, split and fallen trees, debris and growth of invasive plants were evident.

Based on the latest 5-year review, the factors that continue to affect the population of palo de Ramón are related mostly to habitat destruction and modification (Factor A), and other natural and manmade factors (Factor E) (USFWS 2014). The habitat for palo de Ramón continues to be affected by development pressure from residential, industrial, and commercial projects (i.e., landfills, construction of dwellings and roads, power lines, and limestone quarrying) (USFWS 2014). Also, the species is threatened by habitat fragmentation, soil erosion, and changes in forest structure. Moreover, palo de Ramón population at Río Lajas is also threatened by

landslides associated with the construction of highway PR-2 (J. Ríos, USFWS, personal observation 2018).

Palo de Ramón has limited distribution; currently there are 3 natural populations. This makes palo de Ramón vulnerable to extinction due to low population numbers, low numbers of individuals and restricted distribution. Under natural conditions, healthy populations with robust numbers of individuals and recruitment should be adapted to withstand tropical storms, and may be beneficial for the species' population dynamics. The islands of the Caribbean are frequently affected by hurricanes. Puerto Rico has been directly affected by four major hurricanes in recent years: Hugo (1989), Hortense (1996), Georges (1998) and more recently, María (2017). Successional responses to hurricanes can influence the structure and composition of plant communities in the Caribbean (Lugo 2000; Van Bloem *et al.* 2003; Van Bloem *et al.* 2005; Van Bloem *et al.* 2006). Examples of the visible effects of hurricanes on the ecosystem includes massive defoliation, snapped and wind-thrown trees, large debris accumulations, landslides, debris flows, and altered stream channels (Lugo 2008). Hurricanes can produce sudden and massive tree mortality, which varies among species, but average about 41.5% (Lugo 2000). Hence, small populations of palo de Ramón may be severely impacted by hurricanes, even resulting in extirpation of relic individuals. Currently, this species suffers from lack of information and in the absence of knowledge on the natural recruitment capacity and habitat requirements of this species; it is difficult to predict its recovery after natural events such as hurricanes and tropical storms (USFWS 2014).

The genetic variation may be very low in the species, due to the extremely low numbers of individuals in natural populations and the limited geographic distribution of the species (USFWS 2014). Human-induced fire is a current threat for the species at Las Piedras del Collado and adjacent suitable habitat for the species (Pacheco 2013, pers. obs.). The disturbance of natural vegetation within the palo de Ramón habitat may create conditions favorable for the establishment of invasive plant species that may outcompete native plants, changing the vegetation structure and making the sites more susceptible to human-induced fires. Finally, climate change is a factor that might affect the species because of the increase of hurricanes and tropical storms intensities, change rainfall patterns, drought, fires and soil conditions overall (IPCC 2007).

In the early 1990s, the Service and PRDNER established a protocol to propagate the palo de Ramón in the tree nursery at the Cambalache Commonwealth Forest. Over 190 individuals have been propagated (USFWS 1991, Sustache-Sustache 2016). The PRDNER developed a project under Section 6 of the Endangered Species Act and planted these individuals in 8 sites managed by the PRDNER for conservation in Puerto Rico. At Gabias Farm and Cambalache Commonwealth Forest, the planted individuals have become established as evidenced by their successful development, flowering, and fruiting (Pacheco 2013, pers. obs.). However, after Hurricane María no individuals were found (Pacheco 2018, pers. obs.). The status of the other introduced populations is unknown at this time. Overall, planted individuals have been poorly monitored and no updated information on their status is available (USFWS 2014).

## 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 palo de Ramón 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) which is in danger of extinction throughout all or a significant portion of tis 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 provide new delisting criteria for palo de Ramón, which will supersede those included in the Recovery Plan. The recovery criteria presented below represent our best assessment of the conditions that would most likely result in a determination that delisting of palo de Ramón is warranted as the outcome of a formal five-factor analysis in a subsequent regulatory rulemaking. Achieving the prescribed recovery criteria is an indication that the species is no longer threatened or endangered, but this must be confirmed by a thorough analysis of the five factors.

### Amended Delisting Recovery Criteria

The palo de Ramón will be considered for delisting when:

1. Threats reduction and management activities have been implemented to a degree that the species will remain viable into the foreseeable future (addresses Factor A).

2. Existing three (3) populations on Río Lajas, Las Piedras del Collado, and Finca Tres Vidas show a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factor A and E).

3. Within the historic range, establish four (4) additional populations with a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factor E).

**Rationale for Recovery Criteria**

The recovery criteria reflect the best available and most up-to-date information on the species and its habitat.

The principal listing criteria for this species was habitat modification and direct destruction of individuals through deforestation (Factor A) and its small geographic range with only 3 natural populations (Factor E). The palo de Ramón population known to occur on Las Piedras del Collado in the municipality of Salinas is located within the boundaries of approximately 19.4 acres designated by PRDNER as a natural reserve (DRNA 2004). Although the species is located within the reserve, the land needs to be appropriately managed to minimize impacts from visitors (e.g. hikers and bicycles) to natural vegetation. The Río Lajas population is on private land subject to urban development, landslides and the infection of the lobate scale (*Paratrachartina lobate)*. All the trees and saplings observed in 2015 and 2016 were infected by this insect (Sustache-Sustache 2016). The recently discovered population on Finca Tres Vidas in Aibonito, consists of only two individuals. Although this site is private, it is currently managed for conservation.

An additional effort to recover the species was done through the reintroduction of palo de Ramón in seven sites managed for conservation in Puerto Rico. Four of these sites are located in the northern karst region. The other three populations were introduced in the southern face of the central mountain range and in the southern karst region. Although the Service and PRDNER have successfully propagated and planted palo de Ramón, no information is available regarding the minimum number of individuals needed to maintain a stable population.

The rationale for the recovery criteria is to minimize or eliminate the threats to the currently known population at Río Lajas, Las Piedras del Collado and Finca Tres Vidas to the degree that the species is viable or self-sustaining. Since Río Lajas is private property, a conservation mechanism such as a conservation easement or private landowner agreement should be established. As an alternative, a new self-sustaining population should be established within protected suitable habitat in the karst region. Also, the implementation of management and conservation practices on known sites at Las Piedras del Collado and Finca Tres Vidas are needed to maintain either stable or increasing population trends. Since known populations are relatively small, augmenting the number of individuals at these sites would be needed for self-sustainability. Also, establishing a total of four additional healthy and viable or self-sustaining populations (i.e., a population that maintains a stable or increasing trend, evidenced by natural

recruitment and multiple age classes) within suitable protected lands would increase species resilience and redundancy during stochastic events. Utilizing seed material from each discrete population for propagation and the establishment of new populations would help increase representation of palo de Ramón.

## ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

1. Genetic material from all populations is preserved through long-term seed storage and/or propagation efforts at a credited botanical garden.

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