

Recovery Plan for *Pleodendron macranthum* and *Eugenia haematocarpa*
U.S. Fish and Wildlife Service (USFWS). 1998. Recovery Plan for *Pleodendron macranthum* and *Eugenia haematocarpa*. Atlanta, Georgia. 25 pp.

Original Approved: 1998
Original Prepared by: Kenneth W. Foote

AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for the *Pleodendron macranthum* (Chupacallos), and *Eugenia haematocarpa* (Uvillo) since the recovery plan was completed. In this modification, we synthesize the current available information, identify amended recovery criteria, and present the rationale supporting the recovery plan modification. The modification is shown as an addendum that supplements the recovery plan (USFWS 1998), superseding only Part II-A page 8 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

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METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The amendments to the recovery criteria were developed using recent studies on the species and the information contained in the 5-year Status Review for *Pleodendron macranthum* and *Eugenia haematocarpa* (USFWS 2014). The information was analyzed by U.S. Fish and Wildlife Service (Service) biologists and managers in the Caribbean Ecological Services Field Office in order to develop the delisting criteria for 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) 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 [Recovery Plan for *Pleodendron macranthum* and *Eugenia haematocarpa*](#) on page 8.

Synthesis

Uvillo is a small evergreen tree reaching 6 meters (20 feet) tall that was originally known from the Sierra de Luquillo at El Yunque National Forest (hereafter EYNF) and from Sierra de Cayey at the Carite Commonwealth Forest (hereafter CCF). At the time of listing in 1998 the species was known to have about 134 individuals: approximately 119 individuals in six populations at EYNF, and one population of about 15 individuals on a private property adjacent to the CCF (USFWS 2014).

Additionally, six new localities (sub-populations) (Isabela-Guajataca; La Robleda, Cayey; Sotomayor del Toro, Caguas; Río Grande, Las Piedras, and Guayama) with approximately 247 individuals have been reported since listing (USFWS 2014). More recently, Sustache (2016) assessed three populations in the Río Grande Municipality at EYNF and on adjacent private lands and one in the municipality of Juncos (Río Gurabo site). He reported a total of 1,169 individuals, of which 230 individuals are adult trees (Sustache 2016). One of the populations studied contained at least 30 individuals of different size classes with natural recruitment evident. Also, additional individuals were recently found at the CCF (Zegarra 2017, pers. comm.). In 2018, 10 individuals were found in Sierra la Guardarraya, a forest area between Patillas and Maunabo municipalities. This area is known as Marin Alto, a protected land managed for conservation by Para La Naturaleza (Monzon 2018, pers. comm.). New uvillo populations have been found throughout its range, particularly in the southeast part of the Island (i.e., Caguas, Patillas, Maunabo, Juncos, and Cayey). In total, we have documented about 17 localities of uvillo comprising a total of 1,426 individuals.

Due to the number of individuals and the range of the species, we have defined populations based on geographical areas. Thus, we consider a population as any cluster of individuals that are located less than 2 km (1.24 miles) from another cluster, without any major geographical barrier or habitat disruption. The individuals within a defined population can effectively interact by cross-pollination (gene flow) and occur in similar environmental conditions. Therefore, from the 17 known localities of uvillo, we have identified three main populations within the following geographical areas; EYNF, CCF and Guajataca Commonwealth Forest (GCF). Within EYNF, we have identified two sub-populations or localities, El Verde-PR 186 and Río Gurabo. Along the Sierra de Cayey, we identified five localities or sub-populations named; Las Robledas, Sotomayor de Toro, Lago Carite, Charco Azul and La Guardarraya. At the GCF, we have identified two sub-populations; one within the GCF, and the second named Jaicoa.

Some uvillo populations lie within boundaries of the Commonwealth and Federal forest and extend onto private lands. These populations are partially protected and might be affected by land management practices (e.g., clearing for agricultural purposes, fencing, road improvements, and power line repairs and installation) and deforestation for urban development (addressing Factor A). Due to low number of individuals, several of the populations are more susceptible to stochastic events such as hurricanes, landslides, and climate change (addressing Factor E).

However, since the uvillo populations in recent studies have been found in greater numbers in its range, the threat of these stochastic events do not represent an imminent threat to the species.

Chupacallos is a small to medium size aromatic evergreen tree that was known from 11 individuals within EYNF and about 10 individuals within the Río Abajo Commonwealth Forest (RAF) at the time of listing (USFWS 2014). The populations at EYNF consisted of nine trees at the Jimenez Ward and two separated trees at Mameyes II Ward in Río Grande. However, none of these populations were located during the latest surveys conducted by University of Puerto Rico at Mayagüez personnel in March 2011.

The ten individuals from the RAF are found in two separate populations: however, their current status is unknown as they have not been recently visited and their exact locations are unknown (USFWS 1998, USFWS 2014). Since two of the historical localities were represented by a single individual, it is likely they have been extirpated due to stochastic events such as hurricanes (See factor E). Five individuals were planted at El Portal Visitor Center at EYNF. However, only two survived hurricane Maria in 2017 (Gómez 2018, pers. comm.). It is possible that additional populations of chupacallos may occur within the EYNF and probably in some remnants of native forest in the RAF. However, similar to the historically known natural populations, these may be comprised of few individuals with little or no natural recruitment and they might also be threatened by stochastic events such as hurricanes and landslides.

Twenty-two individuals of chupacallos were planted in 2011 in an area adjacent to the Service's Iguaca Aviary, EYNF (Monsegur 2011). After a year of being planted, all individuals remained alive and were actively flowering (Omar Monsegur 2011, pers. obs.). After hurricane Maria, the site has not been accessed and current status of this population is unknown.

Overall, the majority of the known individuals of chupacallos consist of planted trees. Of the 97 total known individuals, the majority (76 individuals) have been planted. Of the 21 naturally-occurring individuals (11 at EYNF and 10 at RAF), none have been observed during the last decade (USFWS 2014). Due to low number of individuals and limited distribution, the species is currently threatened by stochastic events such as, hurricanes, landslides, climate change, genetic variation, lack of recruitment (Factor E) and urban development occurring adjacent to these protected areas (Factor A).

The heavy rains associated with tropical storms and hurricanes in the mountains of Puerto Rico often lead to landslides, which are part of the forest dynamics in Puerto Rico. The frequency of landslides is expected to increase, as landslides are triggered by severe rain events or droughts, whose frequency and severity is expected to increase as a result of climate change (Hopkinson et al. 2008). Species such as chupacallos might be more susceptible since the natural populations occur in limited areas susceptible to landslides that may result in the elimination of entire populations. Lack of natural recruitment represents one of the major threats to chupacallos (Rivera 2011, pers. comm.). Despite evidence of flower and fruit production and good germination under nursery conditions, populations were not recruiting as seedling and sapling stages were missing.

Given the extremely small population size and low number of known natural populations of chupacallos, it is likely that their genetic variability is low. As previously indicated, all

reported populations consist of less than ten individuals, and in some cases they are represented by a single individual (USFWS, 2014). Lack of natural recruitment represents one of the major threats to chupacallos (Rivera 2011, pers. comm.). Despite evidence of flower (Rios 2012, pers. comm.) and fruit production in greenhouses (Monsegur 2012, pers. obs.) and good germination under nursery conditions, it is evident that previously known populations were not recruiting and seedling and sapling stages were missing. Without natural recruitment or successful augmentation from captive propagated individuals, populations (natural and reintroduced) of chupacallos are likely to become extirpated as older individuals naturally die.

Based on the available information, the majority of the known localities of chupacallos and uvillo occur within the boundaries of Federal, State, or other protected areas. However, some of these localities extend to adjacent private lands. For uvillo, of the 17 currently known localities, 8 are within protected areas, 5 occur in private lands, and 4 are partially protected sub-populations (individuals of the sub-population extends to adjacent privately-owned lands). A recent study establishes that the highest increase in population and housing occurs within one km (0.62 miles) of the boundaries of the protected areas located in the eastern part of the island (i.e., El Yunque National Forest), central-east (e.g., Carite State Forest, Sistema de Cuevas y Cavernas de Aguas Buenas Natural Reserve), and north of the island (e.g., Laguna Tortuguero Natural Reserve, Caño Tiburones Natural Reserve). They demonstrated that lands around protected areas in Puerto Rico are extremely vulnerable to development, and residential development can continue to grow despite human population decline (Castro-Prieto et al. 2017).

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 uvillo and chupacallos 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 provide delisting criteria for uவில்lo and chupacallos, which will supersede those included in their 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 uவில்lo and chupacallos 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 listing factors.

Amended Delisting Recovery Criteria:

The amended delisting criteria for uவில்lo and chupacallos are as follows:

1. Three (3) natural populations of uவில்lo and two (2) populations of chupacallos exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes, and populations extending onto private lands are protected through a conservation mechanism (addresses Factors A and E).
2. Establish or discover two (2) new populations of uவில்lo and seven (7) new populations of chupacallos within the historic range of the species that exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes, and populations extending onto private lands are protected through a conservation mechanism (addresses Factors A and E).
3. Threat reduction and management activities (e.g., trail maintenance) have been implemented to a degree that the species will remain viable into the foreseeable future (addresses Factor A).

Justification

Justification for criterion 1: Enhancing or augmenting the currently known populations of uவில்lo (3) and chupacallos (2) to the level they show a stable and/or increasing population trend, showing evidence of natural recruitment, and multiple age classes will have immediate beneficial effects on the species overall viability. Also, augmenting the number of individuals of both species will result in increased resiliency helping the populations to better withstand the risk of stochastic and catastrophic events, occupying a wider range within its already protected habitat. Propagation efforts with strategically selected seeds from all known populations will promote the highest diversity of traits possible into the future.

Justification for criterion 2: The establishment of new populations for both species within suitable habitats in the central mountain range of Puerto Rico, will increase the species redundancy and representation. Presently, one of the most important threats to chupacallos is the low numbers of individuals and few populations indicating the genetic integrity of the chupacallos may be affected. The establishment of two populations of uவில்lo and seven populations of chupacallos will contribute to increase the species' viability and long-term persistence. Also, these recovery criteria will increase these species' ability to withstand future stochastic or catastrophic disturbances.

Justification for criterion 3: Threat reduction and management activities are needed to address threats identified in the latest 5-year Status Review for both species (USFWS 2014). This recovery criterion promotes the implementation of site-specific conservation measures, such as long-term conservation mechanisms, establishing buffer zones, fencing to prevent predation, land management activities within protected areas, outreach and education. These threat reduction and management activities need to be implemented to a degree that the species are viable for the foreseeable future.

Rationale for Recovery Criteria

The delisting recovery criteria reflect the best available and most up-to-date information on the biology, distribution, and habitat of uவில்lo and chupacallos. One of the main recovery approaches is to protect and enhance all currently known natural populations occurring on private lands by establishing long-term conservation mechanisms (e.g., land acquisition, conservation easements and conservation agreements). Conserving and protecting these individuals and their habitats, and maintaining species genetic integrity will increase their viability (addressing Factor A and E).

For uவில்lo, an increasing trend of number of individuals and recruitment have been recently documented addressing Factor A and E (Sustache 2016). However, the majority of the uவில்lo populations on adjacent private lands are currently threatened by land use practices such as agriculture, fencing, road improvement or land clearing for urban development. Conservation easements or landowner's agreements are mechanisms that should be implemented to protect these populations. Also, genetic material from these individuals may be needed for the establishment of new populations in Puerto Rico.

To maintain the genetic integrity of uவில்lo and chupacallos and to increase representation and redundancy throughout the species ranges, the recovery criteria include the establishment of two new populations of uவில்lo to increase populations in the central mountain area and seven populations of chupacallos, using genetic material from currently known populations. For uவில்lo, genetic material may be collected from EYNF and CCF and for chupacallos genetic material may be collected from EYNF and RAF. In addition to maintaining genetic diversity, the goal is to have stable or increasing populations, evidenced by natural recruitment and multiple age classes in the existing and new populations within the species' ranges.

With the establishment of seven additional self-sustaining populations in protected areas for chupacallos (e.g., EYNF (2 populations), RAF (2 populations), Rio Encantado (2 populations)

and CCF (1 population); and two additional self-sustainable populations for uvillo (e.g., Toro Negro and Guilarte Commonwealth Forests), we expect to increase the species viability and long-term persistence. The rationale for this recovery criterion is to enhance the species capability to withstand or return from catastrophic events (e.g., hurricane and landslides) by distributing the species throughout suitable habitats, increasing distribution and abundance, and maintaining representation throughout the species ranges.

According to the 5-year Status Review (USFWS 2014), threats discussed under Factor A have been partially addressed for the chupacallos and uvillo occurring within and outside the boundaries of Federal, State, or other protected areas. An approach to control or eliminate the current remaining threats is through the implementation of site-specific conservation measures (e.g., establishment of buffer zones, fencing, land management activities, section 7 mechanisms, outreach and education). These threat reduction and management activities need to be implemented to a degree that the species are viable. Lastly, the impacts of hurricane Maria need to be assessed for both species, particularly on populations at EYNF which received a more destructive wind impact in relation to other forests in Puerto Rico.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

1. Monitoring should be conducted on both species' phenology and reproductive biology to address other limiting factors affecting these species (e.g., natural recruitment, lack of pollinators or seed dispersers). This recovery action should be coordinated with Puerto Rico Department of Natural and Environmental Resources and United States Forest Service and be included within Task 121, 212, 323, 324: *Monitor all known populations, Assess periodicity of flower production and pollination activity, Assess seed viability and Evaluate seedling establishment and growth* of the approved recovery plan.

LITERATURE CITED

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