Beautiful Goetzea (*Goetzea elegans*) Recovery Plan
U.S. Fish and Wildlife Service (USFWS). 1987. Beautiful Goetzea Recovery Plan. Atlanta, Georgia. 35pp.

Original Approved: April 28, 1987
Original Prepared by: U.S. Fish and Wildlife Service

AMENDMENT 1

We have identified the best available information that indicates the need to amend the recovery criteria for *Goetzea elegans* (Beautiful Goetzea or matabuey) since the recovery plan was completed. In this modification, we 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 1987), superseding only Part II A page 14 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 D. 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 information from our files and information from species experts. This information was prepared by the 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 the endangered matabuey.

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 factors.

Recovery Criteria

See previous version of criteria in *Goetzea elegans* Recovery Plan on page 14.

Synthesis

Matabuey was historically known from the municipalities of Quebradillas, Río Grande, Canóvanas, and Arecibo, Puerto Rico. At the time of listing, approximately 50 matabuey individuals were known from three populations in Isabela and Quebradillas municipalities, while populations from the municipalities of Río Grande, Canóvanas, and Arecibo were extirpated (USFWS 1987). Historically, habitat destruction and modification on the Puerto Rico's north coastal plain in post-Columbian times for agriculture and pastures was the most important factor limiting the distribution of matabuey.

Information related to the biology, habitat, and distribution of matabuey has increased since completion of the recovery plan (USFWS 2013). Habitat destruction and modification by various residential, tourist, and transportation developments; road construction and maintenance; grazing; and cutting, however, continue to threaten the species (USFWS 2013). However, none of the populations known since listing have been lost, and additional populations have been discovered within the municipalities of Quebradillas, Isabela, Fajardo, and Vieques Island (USFWS 2013). The number of known, naturally occurring matabuey individuals has increased from an estimated 50 individuals from 3 populations at the time of listing, to approximately 1,700 individuals from 16 localities or subpopulations occurring on three main populations: Isabela-Quebradillas (Guajataca Gorge), Fajardo, and Vieques Island (Santiago-Valentín 1995, USFWS 2013). Yet, most of the remaining populations are scattered and number between 1 to over 40 adults, and all but one population (on Vieques Island) are located on privately owned lands or along rights-of-ways of existing roads and primarily surrounded by cattle grazing farms (USFWS 2013). The current distribution suggests that the species is restricted to isolated and difficult to access ravines below 500 feet (152 m) elevation with small patches of subtropical moist forest, though this distribution can be explained by deforestation and development of Puerto Rico's north coastal plain (USFWS 2013). Remaining populations likely represent remnants of metapopulations inhabiting one extreme of the species' historical breadth of habitat and range (USFWS 2013).

The recovery plan alluded to future threats related to habitat fragmentation and population isolation that would result from destruction and modification of habitat, but information was not available at the time to fully understand the effects pathway. In the 2013 5-year status review, we synthesized new information describing and quantifying the mating system and conditions favorable for seed germination and seedling and sapling recruitment (USFWS 2013). Matabuey is mainly self-incompatible, requiring out-crossing for successful flower and fruit set (Caraballo-Ortíz 2007). Studies have also shown that fecundity is affected by distance to conspecifics and by flower abundance, which appear to be driven by visits of specific pollinators (bananaquits [*Coereba flaveola*] and honey bees [*Apis mellifera*]) (Caraballo-Ortíz 2007, Caraballo-Ortíz and Santiago-Valentín 2011, and Caraballo-Ortíz et al. 2011). Given the scattered distribution and small size of remaining populations, habitat fragmentation (Factor A), and population isolation

(Factor E) have emerged as threats, adversely affecting population recruitment and likely gene flow among populations. Based on this new understanding, we assume that population sizes were larger in the past, probably some undiscovered populations were lost, and that some portion of the species' genetic diversity may also have been lost.

Propagation efforts have been conducted by numerous institutions since the mid-1990s (USFWS 2013). Hundreds of individuals have been planted in numerous public properties, Commonwealth forests, parks, along roads, and in private properties in at least nine municipalities as part of reforestation efforts, and to assist with the recovery of the species (USFWS 2013). However, there is no information available on whether these planted individuals have produced viable populations (USFWS 2013).

The recovery plan did not incorporate delisting criteria, and established only non-measurable criteria to reclassify the species to a threatened status. Based on the best available information, the recovery of matabuey should focus on conservation of extant genetic diversity and establishing gene flow among remnant populations through population augmentation and increasing connectivity among populations through establishment of additional populations within the historical range. Increasing the number and genetic diversity of individuals within populations and the number of populations would enhance species' representation, resiliency, and redundancy, and ultimately, the likelihood of long-term persistence.

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 matabuey 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 new delisting criteria for matabuey, which will supersede those included in its 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 matabuey 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 amended delisting criteria for matabuey are as follows:

1. The three (3) existing populations on privately owned lands (Guajataca Gorge, Fajardo, and Vieques) are protected through a conservation mechanisms (addresses Factor A).

2. The three (3) existing populations in Guajataca Gorge, Fajardo, and Vieques show a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factor A and E).

3. Establish three (3) new populations in areas protected through a conservation mechanisms within the known geographical range that demonstrate a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).

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

Rationale for Amended Recovery Criteria

The recovery criteria reflect the best available and most up-to date information on the biology, distribution, and habitat of matabuey. The currently known subpopulations of matabuey, except for Vieques, have relatively low counts of individuals (USFWS 2013). In order to maintain the genetic integrity of the species and to provide adequate representation throughout the species range, the recovery criteria have been designed to protect and manage the known populations and to establish new self-sustaining populations to ensure long-term viability of the species.

Our recovery approach is the protection of three (3) populations of matabuey within the Isabela-Quebradillas (Guajataca Gorge) area, Fajardo, and Vieques through long-term conservation mechanisms. Since this species is effectively pollinated by bananaquits and honey bees, genetic exchange among close subpopulations is possible. Therefore, using the Vieques population model, which consists of approximately 1,200 individuals of different age classes (USFWS 2013), we can establish additional subpopulations on protected land within the known

geographic range of the species (Isabela-Quebradillas, Fajardo) and increase its genetic representation, and its resiliency and redundancy to withstand catastrophic events. Long-term management and monitoring of natural and established populations are needed to reduce site-specific threats and to establish population trends for matabuey.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

Current propagation efforts of matabuey should be re-evaluated to ensure those efforts are consistent with the biological and ecological limiting factors of the species, and to ensure establishment of self-sustaining populations in protected areas as recommended by Santiago-Valentín (1995). Trees should be planted approximately 4.5 m (15 ft) apart to obtain a high germination rate (Santiago-Valentín 1995). This recovery action should be coordinated with the Puerto Rico Department of Natural and Environmental Resources and be included within Tasks 33 and 34: *Evaluate feasibility of artificial propagation*, and *Select appropriate sites for population enhancement, reintroduction, or introduction using artificially propagated material*, respectively, of the approved recovery plan.

LITERATURE CITED

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