Aristida portoricensis (pelos del diablo) **Recovery Plan**

Original Approved: 1995
Original Prepared by: Susan Silander

DRAFT AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for *Aristida portoricensis* (pelos del diablo) since the recovery plan was completed in 1995. In this proposed modification, we synthesize the information currently available on this species, assess the adequacy of the existing recovery criteria, show amended recovery criteria, and provide the rationale supporting the proposed recovery plan modifications. The proposed modifications will be shown as an addendum that supplements the recovery plan for *A. portoricensis*, superseding only Part II A page 6. 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
Caribbean Ecological Service Field Office, Region 4
Boquerón, Puerto Rico

December 2018

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The proposed amendments to the recovery criteria are based on recent studies with the species and the information contained in the 2010 5-year review for *A. portoricensis*. These were discussed with 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 *A. portoricensis* (pelos del diablo).

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 *Aristida portoricensis (pelos del diablo)* Recovery Plan on page 6.

Synthesis

The most recent 5-year status review of *Aristida portoricensis* (pelos del diablo) was finalized and signed by the Service on December 2, 2010, and it summarized the information that was gathered since this species was listed (USFWS 2010). Information obtained after 2010 has been added and summarized in this synthesis.

Aristida portoricensis or pelos del diablo, was only known to occur at the LCNWR and at Cerro Las Mesas in the municipality of Mayagüez (USFWS 2010). However, an *A. portoricensis* specimen found at the herbarium of the Puerto Rico Department of Natural and Environmental Resources (PRDNER) is identified to have been collected in 1920 at Primar del Río in Cuba (USFWS 2010a). No further confirmation of this finding has been published. Recently, Fairchild reported finding individuals of pelos del diablo on three properties in Sierra Bermeja: Finca Escabi, Finca Lozada, and Rancho Hugo, but number of individuals was not recorded (Lange et al. 2017). Pelos del diablo has been observed coexisting with endangered grass, *A. chaseae*, along trails, roads, and often on steep slopes (USFWS 2010, Lange et al. 2017). Moreover, although once thought to be extirpated from Cerro Las Mesas in Mayagüez (USFWS 2010), some plants have been recently detected on a private property near the area where the species was originally found (A. Puente, UPRM, 2018, unpublished data).

Although the current distribution and number of individuals for this species have increased since its listing, the species remain threatened by destruction, modification or curtailment of their habitat (Factor A), and by other natural and manmade factors (Factor E) (USFWS 2010). Activities related to housing development, agriculture, livestock grazing, and human-induced fires are some of the threats this species face, particularly on private properties within the Sierra Bermeja area (Lange et al. 2017, USFWS 2010a). Within areas currently protected by the Service (e.g., LCNWR and CRNWR) and areas managed by PLN, impacts by road and trail improvements, accidental cutting, human-induced fires and livestock grazing have been documented. Many of these practices promote invasive plants colonization, which not only compete with native species for resources, but also homogenize the landscape (Lange et al. 2017). As a result, these exotic species dominate the landscapes and serve as fuel that facilitates the spread of wildfires through the area (Lange et al. 2017). Also, the species restricted distribution to access ways increases population threats associated with stochastic events (e.g. heavy rain), which could cause landslide and erosion (Lange et al. 2017). In addition, due to known low number of individuals and limited geographic distribution of the species, factors related to species genetics can threaten its survival (e.g., genetic drift and inbreed depression) (Lange et al. 2017).

Lange et al. (2017) concluded this species can be propagated from seeds, that seeds withstand long periods of time being frozen, and that the species show relative low seed germination and survival. They also observed that seed desiccation improved germination rate for *A. portoricensis* (Lange 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 *A. portoricensis* 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. 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 *A. portoricensis*, which will supersede those included in its Recovery Plans. The recovery criteria presented below represent our best assessment of the conditions that would most likely result in a determination that delisting of *A. portoricensis* 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 *Aristida portoricensis* are as follows:

1. Existing populations of A. *portoricensis* (3) show a stable or increasing trend, evidenced by natural recruitment and multiple age classes, and populations extending onto private lands are protected via a conservation mechanism (Addresses Factor A and E).

2. At least two (2) new populations *A. portoricensis* are established or discovered within the historical range of the species. New populations show a stable or increasing trend, evidenced by natural recruitment and multiple age classes, and populations extending

onto private lands are protected via a conservation mechanism (Addresses Factor A and E).

3. Threat reduction and management activities have been implemented to a degree that the species is viable for the foreseeable future (Addresses Factor A and E).

Justification for Criteria

Justification for criterion 1: *A. portoricensis* occurs in a limited geographic area in southwestern Puerto Rico, mostly on privately owned lands, making habitat loss the most important threat for the species. By engaging with private landowners on conservation mechanisms will ensure the conservation of high quality habitat for the species, and the threat of habitat loss would be reduced to a point where it is no longer considered a threat. The protection of these natural populations is expected to result in an increase in the populations of *A. portoricensis*, and therefore this would result in an increase to their resiliency and representation, enabling the species to withstand and rebound from stochastic events such as landslides and erosion resulting from heavy rains. Habitat and species population enhancement will be accomplished through agreements with landowners and coupled with a monitoring plan to document recovery of the species. Progress towards meeting this criterion will be measured through a stable or increasing population trend, evidenced by natural recruitment and multiple age classes.

Justification for criterion 2: The second recovery criterion focuses on increasing the number of populations for the species aiming to improve their resiliency and redundancy. In order to expand species distribution, these new populations will be established on habitat similar to where natural population occurs and within its geographic range and, if necessary, will represent populations that are currently on the verge to disappear, either due to development or small population size. Increasing the number of populations and broadening the species distribution will enhance their ability to withstand catastrophic and stochastic events. This strategy will be met by implementing the germination and propagation protocols developed by the Fairchild Tropical Botanic Garden.

Justification for criterion 3: Threat reduction and management activities are key to the successful recovery of each of the specie. For example, this species is not adapted to human-induced fires, which is consider a threat due to the species location on dry forest habitat. Moreover, wildfires increase invasive species colonization and, therefore, competition for already limited resources. Implementing management actions to reduce fire threats to the maximum extent possible will not only reduce direct impact to the species, but also will reduce invasive species colonization and associated competition. Hence, the species can spread to other areas as population growth and recruitment increases. Additionally, fencing is another main action that needs to be implemented in order to reduce livestock trampling, another important threat affecting this species. Proper fencing installation will reduce direct impact to individuals and their habitat. The implementation of conservation agreements with landowners will help put these actions into effect on private lands where the species occur.

Rationale for Recovery Criteria

The proposed delisting recovery criteria reflect the best available and most up-to-date information on the biology, distribution, and habitat of *A. portoricensis.*

Our main recovery approach is to protect all currently known natural populations occurring on privately owned 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 result in increasing its viability (resiliency, redundancy and representation). Two private properties within Sierra Bermeja where conservation mechanisms could be implemented are Finca Lozada and Rancho Hugo, which currently hold individuals of this species in Sierra Bermeja. Morover, Rango Hugo holds the largest population known of *A. portoricensis* at Sierra Bermeja. Outside Sierra Bermeja, conservation mechanisms should be implemented on private property in the municipality of Mayaguez where the historical population of *A. portoricensis* was recently rediscovered. Educating private landowners about the species' conservation needs is also necessary in order to advance recovery.

The habitat of this species within the range of Sierra Bermeja remains vulnerable to agricultural practices, and the associated indirect threats (e.g., habitat intrusion by exotic plants and human induced fires). Thus, to ensure we maintain or increase representation of these populations occurring within private lands and whose habitats are vulnerable to development and/or agricultural or grazing activities, we propose the establishment of new populations on protected lands within Sierra Bermeja or in other suitable habitats in Southern Puerto Rico. By broadening the species distribution within its historical range, increasing number of populations, and assuring new viable populations, we will increase the redundancy, representation, and resiliency of *A. portoricensis*.

For the *A. portoricensis.*, we aim to secure the species genetic pool from those individuals that are threatened by habitat destruction and modification (occurring on private lands). Particularly, we aim to secure material of *A. portoricensis* from Cerro Las Mesas and establish at least two populations within areas managed for conservation with similar habitat characteristics, inside and in the proximity of its current geographic range (e.g. Susúa Commonwealth Forest).

Another recovery criterion is the control or elimination of current threats on protected land through site-specific conservation mechanisms. Control or eradication of invasive plant species are deemed essential to reduce resource competition and to minimize fuels that feed wildfires. Moreover, the implementation of wildfire control protocols is needed to reduce the risks of human-induced fires on these lands. This management action will reduce direct impacts to the species and will further minimize the colonization of exotic plant species. The installation and monitoring of fences will help reduce or eliminate impacts related to livestock (e.g., grazing and trampling) within protected lands. Also, educating the maintenance workers on the species characteristics and implementing Best Management Practices on trail and road maintenance within protected lands, will reduce the possibility of accidental cutting and habitat alteration.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

1. Genetic material from all populations of all species is preserved through long term seed storage and/or propagation efforts. The priority is to collect material of *A. portoricensins* at Cerro Las Mesas. This should be added as a new action in the recovery plan.
2. Careful planning for conservation and management needs to be developed and should include partners' education. To be added to recovery action 12 (123).
3. Add Susúa Commonwealth Forest and Plan Bonito as potential reintroduction sites to recovery action 4(411).
4. Implement fire management and control protocols in private lands. This should be added as a new action in the recovery plan.

LITERATURE CITED

Breckon, G.J. and D.A. Kolterman. 1994. Lyonia truncata var. proctorii Judd (Ericaceae). Final Report under Cooperative Agreement No. 1448-0004-93-973 between the Fish and Wildlife Service and the University of Puerto Rico, Mayagüez Campus. 153 pp.

Cedeño-Maldonado J. A., and G. Breckon. 1996. Serpentine Endemism in the Flora of Puerto Rico. *Caribbean Journal of Science* 32(3), 348-356.

Ewel, J.J. and J.L. Whitmore. 1973. The ecological life zones of Puerto Rivo and the U.S. Virgin Islands. Forest Service Res. Paper ITF-18. 72 pp.

Lange, J., J. Possley, and J. Maschinski. 2017. Developing propagation protocols and seed bank for Sierra Bermeja plants: Aristida chaseae, Aristida portoricensis, Lyonia truncata var. proctorii and Vernonia proctorii. Final Report under USFWS Cooperative Agreement #F14AC01201, to USFWS Caribbean Field office and Puerto Rico Departamento de Recursos Naturales y Ambientales (DRNA Permit 2014-EPE-034).

Maschinski, J. and J. Possley. 2015. Saving Sky Island Species in Puerto Rico. *The Tropical Garden,* 70(3) 24-26. Retrieved from https://www.fairchildgarden.org/News-Pressroom-Media-Center/The-Tropical-Garden-Magazine

Morales-Pérez A. 2013. Mapping of Six Federally Endangered Listed Plants and Surveying the Population Status of *Eugenia woodburyana* at La Tinaja, Laguna Cartagena National Wildlife Refuge. Lajas, Puerto Rico. Under USFWS contract F13PX00848. 20 pp.

Puente A., 2018, unpublished data. Puerto Rico Department of Natural and Enviromental Resources and US Fish and Wildlife Services Section 6 Cooperative Agreement Proposal – Fiscal Year 2018.

U.S. Fish and Wildlife Service (USFWS). 1995. *Aristida chaseae, Aristida portoricensis, Lyonia truncata var. Proctorii*, and *Vernonia procotorii* Recovery Plan. Atlanta, Gerogia.

USFWS. 2010. *Aristida chaseae, Aristida portoricensis, Lyonia truncata var. proctorii,* and *Vernonia procotorii* five-year review: summary and evaluation. U.S. Fish and Wildlife

Service Southeast Region, Caribbean Ecological Services Field Office, Boqueron, Puerto Rico.