

Recovery Plan for the Guajón or Puerto Rican Demon (*Eleutherodactylus cooki*)
USFWS 2004. Recovery Plan for the Guajón or Puerto Rican Demon (*Eleutherodactylus cooki*). U.S. Fish and Wildlife Service Southeast Region Caribbean Ecological Services Field Office, Boquerón, Puerto Rico. 36 pp.

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Original Prepared by: Jorge E. Saliva, Kenneth W. Foote, Sondra I. Vega-Castillo

AMENDMENT 1

We have identified the best available information that indicates the need to amend recovery criteria for the threatened frog *Eleutherodactylus cooki* (common name in Spanish: coquí guajón) since the recovery plan was completed. In this modification, we synthesize the currently available information, identify amended recovery criteria, and provide the rationale supporting the recovery plan modification. The modification is shown as an addendum that supplements the recovery plan by superseding the recovery criteria section on page 9 and recovery criteria sections on Table 1, pages 10-11 (USFWS 2004). 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 are based on the latest 5-year status review (USFWS 2017b) and the most recent studies and information for this threatened species. Also, we evaluated other federally listed amphibian recovery plans to guide the new delisting recovery criteria for the coquí guajón (USFWS 2002, 2015, 2017a, 2018). This 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 coquí guajón.

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 current recovery plan only developed interim criteria that would guide the development of more specific and quantifiable delisting criteria. See the interim criteria in the [Recovery Plan for the Guajón or Puerto Rican Demon \(*Eleutherodactylus cooki*\)](#) on page 9.

Synthesis

The coquí guajón was listed as threatened in 1997 mostly due to modification and destruction of its limited specialized habitat (Factor A) ([62 FR 31757](#)). A total of 17 critical habitat units were designated in 2007 for this species ([72 FR 60068](#)). The coquí guajón's range is limited to only seven municipalities in southeast Puerto Rico (USFWS 2004, Fig. 1) and mostly within private lands (USFWS 2017b). The species is considered a habitat specialist since populations only occur within "guajonales" (caves formed by large boulders of granite rock) and/or streams with patches of rocks (USFWS 2004). The unique hydrological and geological combination of these habitats is considered one of the most important attributes for a coquí guajón population occurrence and persistence (Joglar et al. 1996, Vega-Castillo 2000, López-Torres 2008). The species also is known to occur within somewhat disturbed and modified habitats such as adjacent to rural roads, culverts and aqueduct pump stations (USFWS 2017b).

Based on the most recent rapid assessment (November 2012 to March 2014) conducted within 16 of the critical habitats units and 4 other new localities, López-Torres and Longo (2015) found relatively high abundance (100+ individuals) in 13 of the 20 localities, medium (less than 100, but more than 50 individuals) in 5 of the 20 localities, and low (less than 50) abundance in 2 of the 20 localities. This information suggests that most of those 20 coquí guajón populations are stable or increasing, whereas one may be declining and another possibly extirpated. For example, no individuals were found in the Jacaboa critical habitat (Unit 5) in Patillas.

During those surveys, genetic samples collected and analyzed suggest certain populations are isolated and others are well connected through streams and forested corridors. The 19 (no samples from Jacaboa) sampled populations revealed they are divided into five genetic clusters, that gene flow was limited to short distances, and that the Sierra Pandura Mountain Range provides unidirectional migrants to other lower elevation populations (López-Torres and Longo 2015). The Sierra de Pandura populations are particularly important in that region because if they go extinct, lower elevation populations will not receive migrants and thus, their population dynamics (e.g., abundance, genetics, persistence) may be affected. In addition, those lower elevation populations are closer to habitat related threats and possibly more predisposed to degradation (López-Torres and Longo 2015).

In September 2017, category 4 hurricane María made landfall right over the species range in southeast Puerto Rico (<https://coast.noaa.gov/hurricanes/>). Although no formal post-hurricane

assessments have been completed for this species, a professor/researcher visited a known coquí guajón population in the municipality of Humacao, and informed us of a potential decrease of calling male frogs (less than 5) compared to past observations from that site that showed higher abundance (S. Vega, UPR-Arecibo, pers. comm., 2018). Furthermore, in the municipality of Maunabo, a coquí guajón site was temporarily filled to conduct restoration work on a primary power line after the hurricane. This area was eventually restored and the site is still occupied by the species, even a coquí guajón egg mass was documented nearby. This example indicates that, although the species might have survived, direct and indirect hurricane impacts occurred on its habitat. Nonetheless, there is no additional information to assess the post-hurricane status of the species with certainty throughout its entire range.

Main threats to the species continue to be anthropogenic habitat modification and fragmentation, erosion, and agricultural practices that degrade the species' habitat (Factors A and E). The amphibian pathogenic chytrid fungus (*Bd*) and a parasitic tick are now well documented throughout the coquí guajón's range (López-Torres and Longo 2015), but there is no specific information as to how this pathogen and parasite are affecting the population dynamics of the species (Factor C). Based on the species ecology, climate change (Factor E) is also a concern since climate change predictions for Puerto Rico forecast an overall reduction of rainfall across the Island (Bhardwaj et al. 2018) that could be detrimental to the coquí guajón populations. Factors B and D are not considered current threats to the species (USFWS 2017b).

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 coquí guajón 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 the coquí guajón based on the interim criteria provided in the recovery plan (USFWS 2004). The recovery criteria presented below represent our best assessment of the conditions that would most likely result in a determination that delisting the coquí guajón 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 the coquí guajón are:

1. Within the five (5) known coquí guajón genetic clusters, populations are geographically distributed and connected in a manner that allows for the continued existence of populations that exhibit a stable or increasing trends, natural recruitment, and multiple age classes (addresses Factors A, C and E).
2. Suitable habitat of the five (5) known coquí guajón genetic clusters are protected and managed by a conservation mechanism to ensure the ecological integrity of those areas is not affected by adverse anthropogenic habitat modification, including indirect effects of upstream/downstream land uses (addresses Factors A, C and E).

Justification

Justification for criterion 1: To ensure that persistence of the coquí guajón into the foreseeable future, a sufficient number of resilient populations of the species should be distributed throughout at least the five known genetic clusters as described by López-Torres and Longo (2015). In addition to providing redundancy, the purpose of maintaining resilient populations in each of these areas is to retain the representation, hence, the ability of the species to adapt to changing environmental conditions on at least each currently occupied cluster. Populations that exhibit a stable or increasing trend, natural recruitment, and multiple age classes demonstrate that population is secured and will be resilient to stochastic events.

Justification for criterion 2: Abatement of threats to coquí guajón habitat is necessary to provide the conditions necessary for populations to persist and contribute to the species viability. Since most of the populations occur within private lands subject to habitat threats, protecting and managing those habitats where needed is essential to further avoid and reduce detrimental effects. For example, the species is impacted by new road construction, general construction of structures, and clearing of stream edges for agriculture or access to water. Because the genetic,

geographic, and ecological range within each distinct cluster is distributed across seven municipalities, mostly within private lands, multiple preserves will better ensure the long-term sustainability of the species.

Rationale for Amended Recovery Criteria

The recovery criteria herein should allow for long-term viability (representation, resiliency, and redundancy) across the species range so that coquí guajón no longer require the protections of the Act. A resilient population is one that is large enough to maintain sufficient genetic variation to enable it to evolve and respond to natural habitat and environmental changes; to exhibit parameters consistent with a stable or increasing reproductive rate; and has representation from multiple age classes (USFWS 2015). The delisting goal should be to have a sufficient amount of resilient populations across the species range maintaining habitat connectivity that allows maximum dispersal of individuals (gene flow) and ultimately results in self-sustaining populations. A coquí guajón population can be a group of occurrences in a contiguous habitat area, for example, several occurrences in close proximity and/or along the same drainage occupied by one breeding group.

Preventing habitat loss, fragmentation and degradation is of utmost importance to prevent coquí guajón declines (USFWS 2004). A critical step to achieve the recovery criteria will be to identify and monitor an adequate number of populations to conserve each genetic cluster. For example, out of the five genetic clusters described by López-Torres and Longo (2015), they identified and sampled eight populations for the Sierra de Pandura cluster, three populations each for three other clusters, and only two populations for another cluster. Most of these populations are based on the critical habitat designations and will serve as the basis to delineate how much habitat to protect and manage within each cluster. The possible extirpation of the Jacaboa critical habitat unit 5 in Patillas suggests some populations are less resilient than others and that more intense monitoring is necessary in order to detect declines. Reestablishment or recolonization within that unit needs to be further assessed.

The use of genetic tools is important, because they can inform degrees of gene flow within genetic clusters that are a result of the landscape features affecting dispersal (López-Torres and Longo 2015). The five genetic clusters identified by López-Torres and Longo (2015) represent only 19 populations across seven municipalities. These areas, with particular emphasis on the Sierra de Pandura, should be managed and protected as necessary so that they are not threatened by adverse anthropogenic habitat modification, including indirect effects of upstream/downstream land uses. The need to establish long-term conservation mechanisms such as easements or cooperative agreements to help meet the recovery criteria needs to be assessed.

In combination, the recovery criteria will help focus recovery actions to those areas where threats are imminent and of high magnitude. These criteria also provide for better metrics of stability, persistence, and population resilience, than just population numbers. Ultimately, habitat management should focus on protecting, maintaining, enhancing, and restoring essential components of both terrestrial and aquatic habitat that support coquí guajón populations in order to maximize their ability to withstand natural population fluctuations and climate change.

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