Virgin Island Tree Boa Recovery Plan (*Chilabothrus granti*, formerly *Epicrates monensis granti*)
U.S. Fish and Wildlife Service (USFWS). 1986. Virgin Islands Tree Boa Recovery Plan. USFWS, Atlanta, Georgia. 26 pp.

Original Approved: 1986
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AMENDMENT 1

We have identified the best available information that indicates the need to amend recovery criteria for the endangered Virgin Island tree boa (VI boa) since the recovery plan was completed. In this modification, we synthesize the currently available information, assess the adequacy of the existing recovery criteria, show amended recovery criteria, and present the rationale supporting the recovery plan modification. The modification is shown as an addendum that supplements the recovery plan by superseding only the Recovery Objective section on page 14 of the recovery plan (USFWS 1986). 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: _____
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 mostly on the latest 5-year status review (USFWS 2009) and the recent Species Status Assessment (SSA) (USFWS 2108). This information was analyzed by U.S. Fish and Wildlife Service (Service) biologists and managers in the Caribbean Ecological Services Field Office, and the Service's Science Applications program in order to develop the delisting criteria for the VI boa.

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 provided interim criteria that would guide the development of more specific and quantitative recovery criteria. See previous version of criteria in the **Virgin Island Tree Boa Recovery Plan (*Chilabothrus granti*, formerly *Epicrates monensis granti*)** on page 14 (.

Synthesis

The VI boa is a medium-length, slender and nonvenomous snake endemic to Puerto Rico (PR) and the Virgin Islands (US and British), that has been listed as endangered since 1970 (44 FR 70677) due to its restricted and fragmented distribution, predation by invasive mammals, and habitat disturbance. When the recovery plan was written (USFWS 1986), the VI boa was only known to exist in two populations, Cayo Diablo (PR) and St. Thomas (USVI), with a total of 71 known specimens. Other populations did exist at that time, but were not yet known.

More than 20 years later, when the 5-year status review was written (USFWS 2009), the Service recommended downlisting the species to threatened status with seven populations known between PR and the Virgin Islands. Five are wild populations (Río Grande, Culebra Island, and Cayo Diablo in PR, St. Thomas, USVI, and Tortola, British VI) and two are the product of a successful captive breeding, rat eradication and introduction efforts in Cayo Ratones (PR), and USVI Cay (Tolson et al. 2008). The Service estimated between 1,300-1,500 VI boas occur in PR and USVI (USFWS 2009), although some of the population sizes used for this estimate are considered somewhat speculative (USFWS 2018).

The other known wild population occurs in Tortola, British VI, but there is no data on the status of that population. Several other islands and cays have been searched, but the species has not been found and these areas have been overrun by rats (Tolson 1986, 1991). Despite the current disjunct distribution of the VI boa, they were likely historically distributed more widely across the small islands and cays within their range. It is possible that populations exist on other islands or cays, but VI boas are notoriously difficult to find, and no other populations are confirmed to be in existence currently (USFWS 2018).

Threats to the VI boa mainly include habitat loss and fragmentation from human development (Factor A), predation mainly from feral cats (*Felis catus*) and rats (*Rattus rattus*) (Factor C), and climate change, particularly increasing sea levels and frequency of major hurricanes (Factor E). Conservation actions that have benefited the VI boa include captive breeding and subsequent reintroductions, and rat eradication efforts. Other influential factors include negative public attitudes towards snakes, need for education and outreach, genetics (i.e., inbreeding) and the financial resources and political will to carry out conservation (USFWS 2018).

A new systematic VI boa survey approach was already planned when in September 2017, Hurricanes Irma and Maria struck all known VI boa habitats in PR and USVI. Available partners and funds prompted efforts to complete the surveys after the hurricanes. In general, the low

numbers of VI boas found per night were consistent with the species low detection probability. Furthermore, rats were found in Cayo Ratones (Island Conservation 2018), one of the estimated largest populations for this species and where rats had been eradicated (Tolson et. al. 2008, USFWS 2009). No individuals were found in the Culebra Island surveys either, but VI boas are still expected to occur in both Culebra and Cayo Ratones. Consistent with past surveys, VI boa individuals were detected in Río Grande, Cayo Diablo and USVI Cay. This new information was used to complete the VI boa SSA, which gathered the available information, determined the current population resilience and future condition, and the risk of sea level rise and hurricanes (USFWS 2018). Of the six populations evaluated, only the Cayo Diablo VI boa population has moderately high resiliency, while the USVI Cay population has moderate resilience. Both of these cays are offshore islands protected for conservation and are free of exotic mammals. The other four assessed populations (Río Grande, Cayo Ratones, Culebra, and St. Thomas) currently have moderately low or low resilience, but still have suitable habitat in those areas. For example, the recently found rat population of Cayo Ratones (Island Conservation 2018) lowers the resilience of the species on this Island. Nonetheless, as VI boas are difficult to find, the species probably still occurs on this cay, despite not detecting any during the 2018 survey (Island Conservation 2018). The other three populations (Río Grande, Culebra and St. Thomas) are more exposed to threats by habitat loss and degradation from development, as well as by predation from cats and rats typically found in human settlements (USFWS 2018).

The SSA provides more specific details on the expected future condition and risk of sea level rise and hurricanes on all of these populations. Nonetheless, in 30 years sea level rise alone is unlikely to significantly impact VI boa populations. Habitat on low-lying cays (i.e., Cayo Diablo, Cayo Ratones, and USVI Cay) has proven to be resilient to hurricanes in the past, and likely will remain so with 0.30 meters (0.98 foot) of sea level rise expected over the next 30 years. However, the exact impacts of any particular future storm were impossible to predict in the SSA. Cayo Diablo and USVI Cay are most at risk, while there is a moderate risk of sea level rise and storm surge impacts to VI boas and habitat on Cayo Ratones, and low risk at Culebra Island, Río Grande, and St. Thomas (USFWS 2018).

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 VI boa 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 VI boa, which will supersede those included in the recovery plan (USFWS 1986). The recovery criteria presented below represent our best assessment of the conditions that would most likely result in a determination that delisting the VI boa 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.

Amending Delisting Recovery Criteria

The amended delisting criteria for the VI boa are:

1. Existing two (2) VI boa populations with the highest resiliency (Cayo Diablo and USVI Cay) exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factor A, C, and E).

2. Establish three (3) additional populations that show a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factor A, C, and E).

3. Threats are reduced or eliminated to the degree that the species is viable for the foreseeable future (addresses Factor A, and C and E).

Justification for Criteria

Justification for criterion 1: Ensuring the conservation of resilient populations is important for recovery of the VI boa as it will help those populations to further withstand catastrophic and stochastic events. The Cayo Diablo and USVI Cay populations are still susceptible to threats from invasive mammals that could still invade these areas and potentially reduce the VI boa viability. In addition, these resilient populations may serve as sources to establish the new populations outlined in Criterion 1, if maintained at their current level. For example, VI boas were already collected from the USVI Cay population to establish a captive breeding program in order to implement Criterion 1.

Justification for criterion 2: Increasing the number of populations will improve the species' resiliency and redundancy. In order to expand the species' distribution, these new populations will be established on protected suitable habitat where threats from invasive mammals are not present and sea level rise will have minimal impact on the habitat. In addition, increasing the number of populations and broadening the species' distribution will enhance their ability to withstand catastrophic and stochastic events. For this species, it is believed that three additional populations exhibiting these traits is necessary to ensure sufficient redundancy such that the species will no longer require protection under the Act.

Justification for criterion 3: Reducing threats mainly from habitat degradation to the VI boa populations that occur in larger areas (St. Thomas, Culebra, and Río Grande), will increase the resiliency of those populations. The resiliency for those populations is currently considered moderately low to low (USFWS 2018). Thus, threat reduction through management activities is important to the successful recovery of the VI boa. Managing invasive mammal threats in these areas is not practical at this time, but the Service will continue to assess potential control strategies in the future if feasible.

Rationale for Amended Delisting Recovery Criteria

The delisting recovery criteria are based on the best and most updated scientific information on the biology, distribution, and habitat of the VI boa.

The establishment of the two self-sustaining populations (Cayo Ratones in 1993 and USVI Cay in 2002) after the removal of invasive mammals was one of the most important steps towards the recovery of this species, since it demonstrated that increasing redundancy was achievable at a relative low cost. Building from that experience, we deem essential the establishment of additional VI boa populations (Criterion 1) where removal of invasive mammal predators is feasible. Removal and/or control of invasive predators from large, human-populated islands like Puerto Rico, Culebra, and St. Thomas is unpractical. Rather we believe that avoiding and minimizing habitat disturbance in those areas is a more realistic management approach (Criterion 3), thus providing the best available habitat for the species to persist. Nonetheless, further assessment of potential control strategies of invasive mammals in these areas should be considered. Education efforts should also be part of that strategy. In addition, it is crucial that all new VI boa populations are established on high elevation (above sea level) sites to account for sea level rise into the foreseeable future.

Criterion 1 and 3 maintain resiliency of the currently known populations and reduce threats. Populations that occur in Río Grande, Culebra, and St. Thomas are more challenging to manage and to determine their overall status. However, those populations have demonstrated resilience, possibly because of the large amount of habitat and the presence of other resources available to predators besides VI boas. In addition, there are some areas with plenty of suitable habitat, for example, within the Culebra National Wildlife Refuge. The rest of the populations occur within small cays where threats (e.g., invasive mammals, sea level rise) are more intense due to the reduced amount of habitat and less availability of diverse resources for predators. For example, Cayo Ratones has been recolonized by rats, highlighting the importance of ongoing monitoring

of threats. Newborn and juvenile life stages of the VI boa are thought to be most vulnerable to rat predation. Thus, predation by rats or cats is potentially limiting recruitment in all VI boa populations where these mammals are present. Cats are thought to potentially affect all life stages of the VI boa. Actions towards monitoring population trends and threats abatement (i.e., predation control/eradication, habitat enhancement, implementation of VI boa specific conservation measures) are essential in order to ensure the VI boa meets the new criteria.

Through Criterion 2, we expect the VI boa gets established on new areas and increases its viability and thus, persists into the foreseeable future. As with any reintroduction plan, there are some uncertainties on how the species will respond, as well as unforeseen circumstances that may arise, for example, a new threat. The Service will work together with multiple partners to strategically and efficiently implement the new criteria. For example, through Section 6 of the Endangered Species Act we are working with the VI Department of Planning and Natural Resources and they already have identified potential reintroduction areas for the VI boa as well as other partners and Section 6 funds to allocate to that effort.

LITERATURE CITED

Tolson, P.J. 1986. A Report on the Survey of Congo Cay, Outer Brass Island, and Savanna Island, U.S. Virgin Islands. 5 pp.

Tolson, P. J. 1991. Conservation status of Epicrates monensis (Serpentes Boidae) on the Puerto Rico Bank. In: J.A. Moreno (ed.) Status y distribución de los anfibios y reptiles de Puerto Rico. Publ. Cien. Misc. No.1 DRN Puerto Rico. pp. 11-63.

Tolson, P.J., Garcia, M.A., and J. J. Pierce. 2008. Re-introduction of the Virgin Islands boa to the Puerto Rico Bank. Pp. 66-69 In: P. Soorae (Ed.) Global Re-introduction Perspectives: re-introduction case-studies from around the globe. IUCN/SSC Re-introduction Specialist Group, Abu Dhabi UAE. Viii+284p.

U.S. Fish and Wildlife Service (USFWS). 1986. Virgin Islands Tree Boa Recovery Plan. USFWS, Atlanta, Georgia. 26 pp.

U.S. Fish and Wildlife Service (USFWS). 2009. Virgin Islands tree boa (*Epicrates monensis granti*) 5-Year Review: Summary and Evaluation. USFWS, Boquerón, Puerto Rico. 25 pp.

U.S. Fish and Wildlife Service (USFWS). 2018. Virgin Islands Tree Boa (*Chilabothrus granti*) Species Status Assessment. USFWS, Atlanta, GA. 62 pp.