Recovery Plan for Puerto Rican Broad-Winged Hawk (*Buteo platypterus brunnescens*) and Sharp-Shinned Hawk (*Accipter striatus venator*)

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DRAFT AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for both the Puerto Rican broad-winged hawk and the Puerto Rican sharp-shinned hawk since the recovery plan was completed. In this proposed modification, we synthesize the currently available information, show amended recovery criteria, provide the rationale supporting the proposed recovery plan modification, and present some emergency actions, including captive rearing, to prevent the imminent extinction of the Puerto Rican sharp-shinned hawk. The proposed modification will be shown as an appendix that supplements the recovery plan, superseding only Section II Recovery, page 17 of the recovery plan. Recovery plans are a non-discretionary 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

March 2019

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

The proposed amendments to the recovery criteria are based on the latest 5-year status review, information from recent field surveys, and information from species experts. This information was discussed among the 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 Puerto Rican broad-winged and sharp-shinned hawks.

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) have also affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors (ESA 4(a)(1)).

Recovery Criteria

The existing recovery plan provides only downlisting criteria for the Puerto Rican broad-winged hawk and Puerto Rican sharp-shinned hawk. See previous version of criteria in Puerto Rican

Broad-Winged Hawk (*Buteo platypterus brunnescens*) and Sharp-Shinned Hawk (*Accipter striatus venator*) Recovery Plan on page 17.

Synthesis

Puerto Rican Broad-winged Hawk (BWHA). The BWHA was formally listed in 1994 and the Recovery Plan was established in 1997. The latest 5-year review was completed in 2010 (USFWS 2010) and summarized relevant information between 1997 and 2010.

Puerto Rican BWHAs are found primarily in limestone forests of the karst region in north-central Puerto Rico, and mature closed canopy forests including elfin woodlands, sierra palm, caimitillo-granadillo, and tabonuco forests found in the Central Mountain Range (Cordillera Central) region of the Island (USFWS 1997, 2010). At the time of the last 5-year review, the BWHA island-wide population was estimated at approximately 125 individuals (USFWS 2010). The species was found in discrete non-connected patches with a population center in Río Abajo Commonwealth Forest (RACF; approximately 52 individuals) (Hengstenberg and Viella 2004) and other smaller populations in El Yunque National Forest (EYNF) and Carite Commonwealth Forest (CCF; Delannoy 1997). It was not found in the Maricao Commonwealth Forest (MCF) or Toro Negro Commonwealth Forest (TNCF; Delannoy 1997, USFWS 2010). These birds are highly territorial, suggesting little migration into adjacent habitats (Delannoy and Tossas 2002). In RACF the average annual home range size was 106 hectares (261.9 acres) and a breeding home range size was 82.5 hectares (203. 9 acres); and importantly, BWHAs utilized reforested and regenerated forest areas (Delannoy and Tossas 2002).

The population of BWHAs centered in the RACF appeared relatively stable (Hengstenberg and Viella 2005, Llerandi 2006) prior to the 2017 passing of Hurricanes Irma and María, but their distribution across the rest of their potential habitat was not well understood, which prompted an island-wide surveys in 2016-2017 (Vilella and Gallardo 2018). Vilella and Gallardo (2018) found BWHAs in 31 of 63 survey stations and a total of 117 individuals were observed. Seventy-seven BWHAs were found in the municipality of Arecibo, 36 in Utuado, and 10 inside RACF. These surveys re-emphasized the geographic hub of this species in the karst region of RACF and surrounding private lands where the majority of suitable habitat is found. Additional patches of suitable habitat are found in the eastern Cordillera Central, the eastern Cayey mountains, and southern sections of the Luquillo mountains in EYNF. Habitat models developed using these 2016-2017 surveys indicated that rainfall (100-300 mm, 3.9-11.8 inches) and elevation (150-700 m, 492-2,297 ft) were the best predictors of BWHA occurrence, 80% of which occurs on private lands (Vilella and Gallardo 2018).

Post-Hurricane María field surveys conducted in February 2018 in RACF and adjacent lands, recorded between 19 and 34 individuals per sampling day in and around the protected area (USFWS 2018a). Observed abundances are substantially reduced compared to earlier pre-storm estimates (e.g., 52 birds, Hengstenberg and Viella 2004). Moreover, this post-Hurricane María survey identified two nesting efforts in traditional nesting territories as well as a 3rd nesting effort in a new territory, giving hope of successful natural reproduction even though the forest sustained severe and extensive damage. Finally, surveyors also identified at least one bird in

Limon Ward, Utuado, which represents a new location and extension of its former range (USFWS 2018a).

It needs to be stressed that the major habitat characteristic that may limit this species, is mature closed canopy forests (Hengstenberg and Viella 2004). During the time preceding the 2010-5-year review, this species was found predominantly on public lands. However, there was ample evidence of their use of private lands resulting in recommendations to build conservation partnerships with private landowners outside of existing protected areas, and specifically RACF (Hengstenberg and Viella 2004, 2005, USFWS 2010). Destruction and modification of habitat was deemed the greatest threat to this species (USFWS 2010). This threat is notable after the recent passing of Hurricane's Irma and María in 2017, which caused extensive damage to the high elevation forests where BWHAs are found. Other threats such as take, disease or predation, inadequacy of regulation/enforcement were not deemed to be major threats (USFWS 2010). However, in direct connection to habitat destruction, the earlier threat analysis pointed out the risk inherent to the sustainability of such a small population and the threat of hurricanes/storms to directly or subsequently (i.e., post-storm habitat loss) lead to extinction. Population declines were observed after Hugo (1989) and possibly Georges (1998) (USFWS 2010). Thus, the primary threat to this species are Factors A and E.

Puerto Rican Sharp-shinned Hawk (SSHA). The SSHA was formally listed in 1994 and the Recovery Plan was established in 1997. The latest 5-year status review for this species was completed in August 2018 (USFWS 2018b), and it summarized relevant new information between 2013 and 2018.

SSHAs are primarily found in high elevation mature closed canopy forests. Historically, this species was known to occur in five forests within the central mountains of Puerto Rico: MCF, TNCF, CCF, Guilarte Commonwealth Forest (GCF), and EYNF. TNCF and MCF were historically considered the main population strongholds (Vilella and Gallardo 2018, Thorstrom and Gallardo *in press*). Extensive surveys have shown that the population has been in decline for the past 30 years (Delannoy 1984, 1992, Vilella and Gallardo 2018, Thorstrom 2017). The island-wide SSHA population was estimated to be 150 individuals in 1992 but decreased to an estimated 100 individuals in 2016 (Vilella and Gallardo 2018, Thorstrom and Gallardo *in press*). Notable is the significant population decline of 86% (from 55.8 to 8 individuals), and 53% (from 55.4 to 26 individuals) in the MCF and TNCF, respectively (Delannoy 1992, USFWS 2018b, Thorstrom and Gallardo *in press*). The present population center of the species is thought to be in the central portions of the Cordillera Central, specifically in the region encompassing GCF, TNCF, Tres Picachos Commonwealth Forest (TPCF), and La Olimpia Commonwealth Forest (OCF), and the private lands around them. This newest set of research (i.e., since 2013) indicates far more occurrence on private lands than historical distributions (Vilella and Gallardo 2018, Thorstrom 2017). There is a gap in our knowledge of the eastern Cordillera Central, as CCF and EYNF received far less monitoring effort than the more central locations (USFWS 2018b). However, efforts in 2014 and 2016-2017 in CCF resulted in only a single male detected (Vilella and Gallardo 2018) and there are no recent observations in EYNF (USFWS 2018b).

There have been several habitat modeling efforts (Gould 2007, Vilella and Gallardo 2016, Gallardo and Vilella 2017), the most recent of which estimated 56.1 km^2 (13,862 acres) of

suitable habitat representing only about 0.6% of the island's area. The model predicts occurrence (>60% probability) in habitats over 400 m (1,312.3 ft) elevation and forest canopy cover ≥ 60% (Cruz and Delannoy 1986, Gallardo and Vilella 2017). Only 43.8% of highly suitable habitat is in public ownership (Gallardo and Vilella 2017). Historically, SSHA were observed in habitats above 400 m elevation (Delannoy 1997, Vilella and Gallardo 2016), but more recently (surveys between 2013 and 2016) most SSHAs were encountered between 800 m (2,625 ft) and 1,220 m (4,003 ft) elevation, and of 17 pairs observed, only 4 were observed between 600 and 800 m (1,969-2,625 ft) (Vilella and Gallardo 2016). Also, consistent with historic observations, all SSHA territories were within closed canopy patches (Delannoy 1984, Cruz and Delannoy 1986, Vilella and Gallardo 2016).

Surveys in early 2018 after Hurricane María in TNCF, MCF, and GCF detected only 19 individuals (Thorstrom and Gallardo 2018). Frequently, island raptors fail to produce fledglings after large disturbances (Thorstrom and Gallardo 2018), which greatly increases concern for the immediate survival of this species. Therefore, a hacking (release) program was recommended and implemented earlier this year in a collaborative effort between USFWS, Puerto Rico Department of Natural and Environmental Resources (PRDNER), and The Peregrine Fund (Thorstrom and Gallardo 2018). During the 2018 breeding season, six nesting pairs were identified of which 3 were managed (eggs taken into captivity for artificial incubation, hatched and young were placed in a hackbox for release back into the wild). Managed pairs produced 8 eggs, resulting in 6 nestlings with all 6 fledging. Additionally, the four unmanaged nests produced 9 eggs, 7 nestlings, but only 2 fledglings (Thorstrom, TPF, pers. comm. 2018). In years prior to the storm, 8-18 monitored nesting attempts resulted in 12-15 young fledged annually (42 total fledged from 38 nesting attempts 2015-2017; Thorstrom, TPF pers. comm. 2018).

Similar to the BWHA, the greatest threat to SSHA viability, at the time of listing through the present, is habitat destruction and modification. Similarly, hurricanes and tropical storms represent a related threat through direct, storm caused, mortality, as well as post-event mortality related to habitat destruction. Bot-fly, and Pearly-eyed Thrasher and Red-tailed Hawk parasitism and predation, respectively, are potential threats, especially given the small SSHA population size (USFWS 2018b), however, the primary threats of concern are Factors A and E.

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 species 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 the BWHA and SSHA, 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 the BWHA and SSHA 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.

Delisting Recovery Criteria

The amended delisting criteria for BWHA and SSHA are as follows:

1. BWHA and SSHA occur in at least 75% of their respective suitable habitat (addresses Factors A and E).

2. Within the island-wide distribution there will be at least three (3) populations of each species within existing protected areas that show stable or increasing population trends, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).

3. Habitat corridors exist between at least 3 protected areas that support BWHA and SSHA populations (as defined in criterion 2) (addresses Factors A and E).

Justification

Justification for criterion 1: The distribution of BWHA across Puerto Rico is limited to a few small patches that are not well connected, similarly, there are very few SSHAs remaining in the wild, this species is in grave danger of extinction due to limited population size. This first criterion aims to increase the distribution of both species across the landscape enhancing its

resiliency to environmental disturbances, such as hurricanes that typically (although not the case with Hurricane María) have stronger impacts on discrete portions of the island, thus assuring that these species occur in the majority of available suitable habitat will increase their resilience to such events.

Justification for criterion 2: This criterion for the BWHA and SSHA is intended to address redundancy and assuring that multiple stable populations exist within protected areas. The focus on protected areas assures a core area of security for each population center. For the BWHA and SSHA, it is believed that 3 populations exhibiting these traits provides sufficient redundancy to ensure the species will no longer require protection under the Act.

Justification for criterion 3: Assuring that the established populations of BWHA and SSHA are connected by green corridors enhances their resilience by facilitating natural recolonization after an event such as a hurricane that might damage habitat and/or reduce population size. Corridors also facilitate population connectivity increasing genetic diversity maintaining long-term representation of genes among the geographic populations.

Rationale for Amended Recovery Criteria

The proposed recovery criteria reflect the best available and most up-to-date information on the status of BWHA and SSHA. Both species have highly specialized habitat requirements, but are limited to very discrete patches of available habitat due to their low population size. The SSHA in particular is at acute risk of imminent extinction following Hurricane María. Assuming emergency recovery measures can reduce the imminent threats, the criteria are established to assure long-term resilience through multiple stable populations and connectivity among population centers. The first criteria however, is to increase numbers and more completely assure that BWHA and SSHA are more widely distributed throughout their potential range (of suitable habitat). Specifically assuring that BWHA and SSHA occur in the majority (at least 75%) of available suitable habitat will increase their resilience to such events. Suitable habitat may be defined as >60% probability of occurrence in habitat-based occupancy models (e.g. Vilella and Gallardo 2018). For SSHA, suitable breeding habitat is limited to >900 m elevation and mature closed canopy (>60% canopy cover) forest (Gallardo and Vilella 2017). Suitable habitat is highly limited for these species. Specifically, Gallardo and Vilella (2017) estimated that only 0.6% of the island's area provides suitable habitat for SSHA, or a total of 56.1 km^2 (13,862 acres). Further, it was also estimated that only 43% of suitable habitat is in public ownership. Earlier observations indicated that breeding territory size was approximately a pair per square kilometer, thus, particularly for SSHA available suitable habitat will always limit this population.

Assuring that population centers of both species are within existing protected areas provides security that population gains can be sustained and provides core areas where they may disperse from as the population increases. For BWHA, we suggest pair densities of 1 pair/0.8 km^2 (197 acres) (Delannoy and Tossas 2002) within the individual protected areas with spillover into adjacent private/other lands immediately surrounding the protected area. Surrounding lands should show similar (habitat adjusted) densities (i.e., habitats within the protected area appear saturated). For SSHA, we suggest stable breeding pair densities of 1 pair/1.0 km^2 (247 acres)

(USFWS 1997, average breeding pair density across 5 protected areas in surveys 1983-1985) over at least 20 years within the individual protected areas with spillover into adjacent private/other lands immediately surrounding the protected area as described above for BWHA. These density goals are based on the best available science as cited above, but should be updated as new science becomes available. The 'spillover', or nesting activity outside of the protected area is key to increase overall population size and increase connectivity to other population centers, but should also serve as an indicator of habitat saturation within the protected area. As suitable habitats reach carrying capacity, breeding and general use should increase in less ideal habitats. Maintaining a breeding density for 20 years for the BWHA and SSHA is recommended as this encompasses at least 6-20 generations of birds (assuming 1-3 years to sexual maturity).

Assuring that the established populations of BWHA are connected by green corridors enhances their resilience by facilitating natural recolonization after an event such as a hurricane that might damage habitat and/or reduce population size. Corridors also facilitate population connectivity maintaining genetic diversity and long-term representation of genes among the geographic populations. Effectiveness of corridors (e.g., sufficient forest width and canopy cover to facilitate movement) should be evidenced by successful movement of marked BWHAs among protected areas and through genetic markers.

These criteria were established based on the most recent information available with the ultimate conservation goals of: 1) increasing the population size island-wide, 2) assuring population centers are in habitats (i.e., protected areas) that will provide long-term security, 3) in the case of BWHA assure that the population centers are connected through suitable habitat so as to maximize the dispersal capacity of the species and more readily assure healthy meta-population structure and genetic diversity. Collectively reaching these criteria should lift the threat of extinction by assuring their wide distribution among suitable habitats (resilience), increasing redundancy with three stable populations, and increasing connectivity to maintain population structure (representation) and to facilitate natural recolonization (resilience and redundancy) after a disturbance.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

1. Implement a captive breeding program or hacking program for the SSHA to stabilize the population to at least pre-hurricane levels to decrease the risk of imminent extinction. Continuing the hacking program until nesting pair densities reach target levels would greatly speed up recovery. This action relates to recovery task 1.9: study the possibility of translocating individuals.

2. Increase monitoring efforts and in particular coordinate with ongoing island-wide acoustic monitoring, especially in areas known to hold BWHA and SSHA (e.g. RACF, MCF, EYNF). This action relates to recovery tasks 1: Monitor BWHA and SSHA; 1.1: Conduct surveys within the known range of the species and determine population trends; and 1.5: determine spatial and temporal usage of habitat.

3. Plan and implement forest recovery and enhancement efforts in public lands that hold BWHA and/or SSHA, as well as surrounding private lands. The goal of the plans and

implementation should be to develop mature closed canopy forest of tree species preferred by BWHA and SSHA as quickly as possible. We recommend coordinating with U.S. Forest Service, PRDNER, and other partners on existing, ongoing, and future forest recovery and forest management efforts (e.g., hurricane recovery) to assure that preferred tree species are utilized and efforts focus on population centers and connecting corridors. Coordination with agency programs that purchase land or provide conservation easements through landowner agreements (e.g., USFWS Partners Program, USFS Forest Legacy Program, NRCS) is also recommended. This action relates to recovery tasks 2: Protect and manage populations and habitats of the BWHA and SSHA; 2.1: develop management plans; 2.2: implement management plans; and 2.4: obtain protective status for habitat on privately-owned lands.

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