Puerto Rican Sharp-shinned Hawk
(*Accipiter striatus venator*)

5-Year Status Review:
Summary and Evaluation

U.S. Fish and Wildlife photo by Mike Morel

U.S. Fish and Wildlife Service
Southeast Region
Caribbean Ecological Services Field Office
Mayagüez, Puerto Rico

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STATUS REVIEW
Puerto Rican Sharp-shinned Hawk (*Accipiter striatus venator*)

GENERAL INFORMATION

Current Classification: Endangered

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Date of Original Listing: October 11, 1994 (59 FR 46710; September 9, 1994)

Methodology used to complete the review: In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology, habitat, and threats of the Puerto Rican sharp-shinned hawk (*Accipiter striatus venator*; hereafter referred to as hawk or sharp-shinned hawk) to inform this status review. In conducting this 5-year review, the Service relied on the best available information pertaining to historical and current distributions, life history, ecology, and habitat of this species. Much of the information contained herein is taken from the previous 5-year review, the species' recovery plan, and peer-reviewed reports, agency reports, and currently unpublished survey data and reports. This review was completed by the U.S. Fish and Wildlife Service (Service) in collaboration with University of Georgia and research, surveys, and monitoring information from The Peregrine Fund (TPF), which has been instrumental in the recovery efforts of endangered Puerto Rican sharp-shinned hawk. All the Service's recommendations resulting from this review are the result of thoroughly reviewing the best available information on the Puerto Rican sharp-shinned hawk.

FR Notice citation announcing the species is under active review: 87 FR 29364; May 13, 2022

Species' Recovery Priority Number at start of 5-year review: 3, signifying a subspecies with a high degree of threat and high recovery potential.

Review History:
The recovery plan of the Puerto Rican broad-winged hawk and Puerto Rican sharp-shinned hawk (*Buteo platypterus brunnescens* and *Accipiter striatus venator*), approved and signed on September 8, 1997 (Service 1997), along with the progress reports of the research conducted by the Service and its collaborators between 2013 and 2016.

The previous 5-year review was completed on September 7, 2018, which resulted in a recommendation that the subspecies still meets the definition of an endangered species.

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature

This subspecies is considered part of the "*striatus* Group" (Bildstein et al. 2020) and is considered a valid species in the Integrated Taxonomic Information System (ITIS 2023). There has been recent genetic evidence that the Puerto Rican sharp-shinned hawk, along with two other endangered endemic Caribbean sharp-shinned hawk subspecies should be elevated to species rank, to *A. venator* on Puerto Rico, *A. striatus* on Hispaniola, and *A. fringilloides* on Cuba (Catanach et al. 2021). Although the Service recognizes that there is suggested new taxonomic information related to the species, this information is relatively new and has not undergone a thorough review by the field of experts or supported by additional research. At this time, the remainder of the review will address the entity as it was listed under the Act (i.e., *Accipiter striatus venator*). We will review these taxonomic changes again as more science becomes available.

Distinct Population Segment (DPS)

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This species was not listed as a DPS, and we have no new information that would indicate the species should be listed as a DPS under the Service's 1996 DPS Policy.

Recovery Criteria

Recovery Plan or Outline

Recovery Plan: Puerto Rican Broad-Winged Hawk and Puerto Rican Sharp-Shinned Hawk (*Buteo platypterus brunnescens* and *Accipiter striatus venator*) Recovery Plan, September 1997 (Service 1997).

Recovery Plan Amendment: Recovery Plan Amendment for Puerto Rican Broad-Winged Hawk (*Buteo platypterus brunnescens*) and Sharp-Shinned Hawk (*Accipiter striatus venator*), September 2019 (Service 2019).

Recovery plans are not regulatory documents and are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved. If the recovery criteria defined in the plan are still valid, meeting recovery criteria can indicate that the species no longer requires protections under the Act. However, when recommending whether a listed species should be delisted, the Service must apply the factors in section 4(a) of the Act (84 FR 45020).

Below are the delisting criteria identified in the 2019 Amended Recovery Plan for the Puerto Rican broad-winged hawk (BWHA) and the Puerto Rican sharp-shinned hawk (SSHA) (Service 2019):

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 three (3) protected areas that support BWHA and SSHA populations (as defined in criterion 2) (addresses Factors A and E).

The Service believes these criteria are appropriate and relevant. Research completed by TPF with the Puerto Rican sharp-shinned hawk has found some evidence of connectivity between the Toro Negro, Guilarte and Maricao Commonwealth forests. Further data and analysis are needed to understand if criterion 3 has been met for Puerto Rican sharp-shinned hawk. Neither criterion 1 nor 2 have currently been met.

Biology and Habitat Summary

A review of the general biology and habitat of the Puerto Rican sharp-shinned hawk can be found in the 1997 Recovery Plan and the 2018 5-Year Review (Service 1997, 2018).

At the time of listing, this species was known to occur in five locations in Puerto Rico: Maricao Commonwealth Forest (MCF), Toro Negro Commonwealth Forest (TNCF), Guilarte Commonwealth Forest (GCF), Carite Commonwealth Forest (CCF), and El Yunque National Forest (EYNF former Caribbean National Forest). These four Commonwealth forests are under the administration of the Puerto Rico Department of Natural and Environmental Resources (PRDNER), and EYNF is administered by the U.S. Forest Service (USFS). An island-wide population was estimated at 150 individuals reported in 1992 (Delannoy 1997).

The population of the sharp-shinned hawk declined significantly after the habitat destruction from Hurricane María (Category 4-5 storm) to a low of 19 individuals (Thorstrom 2019). The Peregrine Fund has been conducting yearly surveys since 2015 across known sharp-shinned hawk habitats (Figure 1; Gallardo and Vilella 2017). These included TNCF, MCF, GCF/La Olimpia Forest, CCF, EYNF, and certain private lands in humid montane zones near these forests. The GCF and La Olimpia Forest are two separate forest units managed by PRDNER and Casa Pueblo (a non-profit environmental community-based organization in the municipality of Adjuntas), respectively, but due to their proximity TPF addressed them both as one region. In 2022, a satellite tagged juvenile female was recorded in the municipality of Florida in the karst region (Weaver, TPF, 2023, pers. comm.), though this location is not believed to support resident individuals. Since 2018 surveys have documented 22-37 adult individuals each year (Table 1; Thorstrom 2019-2022, unpublished data from The Peregrine Fund). As of June 2023, current field season (still ongoing) has reported 41 individuals sighted (not included in Table 1) (Thorstrom et al. 2023).

Conservation efforts implemented by The Peregrine Fund since 2018 with support from the Service and PRDNER include maximizing nest success given the substantial impact of Hurricane María on the species. Work included removing clutches of eggs from nests, which were raised and released back into the wild. This allowed the sharp-shinned hawks to raise a second clutch of eggs naturally (e.g., double clutching). This effort would maximize nesting success because nest predators including rats (*Rattus* spp.) and pearly-eyed thrashers (*Margarops fuscatus*) are a large source of mortality of eggs and nestlings (McClure et al. 2022). Additionally, nestlings' mortality is reduced by treating nest flies (*Philornis* spp.) with a 1% solution of PermaCap CS insecticide (permethrin) approximately 1 week before the eggs are due to hatch (Weaver 2023, pers. comm.).

Table 1. Puerto Rican sharp-shinned hawk number of pairs and individuals detected by The Peregrine Fund between 2018 and 2022 (Thorstrom et al. 2018-2022, unpublished data from The Peregrine Fund). TNCF = Toro Negro Commonwealth Forest, GCF = Guilarte Commonwealth Forest, MCF = Maricao Commonwealth Forest, CCF = Carite Commonwealth Forest, and EYNF = El Yunque National Forest.

Nesting Season	**Location**	**Territorial Pairs**	**Non-paired Individuals**	**Total Individuals**
2018	TNCF	4	2	10
2018	GCF/La Olimpia Forest	2	2	6
2018	MCF	2	2	6
2018	CCF	0	0	0
2018	EYNF	0	0	0
Total 2018		**8**	**6**	**22**
2019	TNCF	6	3	15
2019	GCF/La Olimpia Forest	1	3	5
2019	MCF	3	0	6
2019	CCF	0	0	0
2019	EYNF	0	0	0
Total 2019		**10**	**6**	**26**
2020	TNCF	6	2	14
2020	GCF/La Olimpia Forest	3	5	11
2020	MCF	1	2	4
2020	CCF	0	0	0
2020	EYNF	0	0	0
Total 2020		**10**	**9**	**29**
2021	TNCF	5	5	15
2021	GCF/La Olimpia Forest	3	2	8
2021	MCF	1	1	3
2021	CCF	0	0	0
2021	EYNF	0	0	0
Total 2021		**9**	**8**	**26**
2022	TNCF	6	3	15
2022	GCF/La Olimpia Forest	4	5	13
2022	MCF	1	6	8
2022	CCF	0	0	0

Nesting Season	Location	Territorial Pairs	Non-paired Individuals	Total Individuals
2022	EYNF	0	1	1
Total 2022		**11**	**15**	**37**

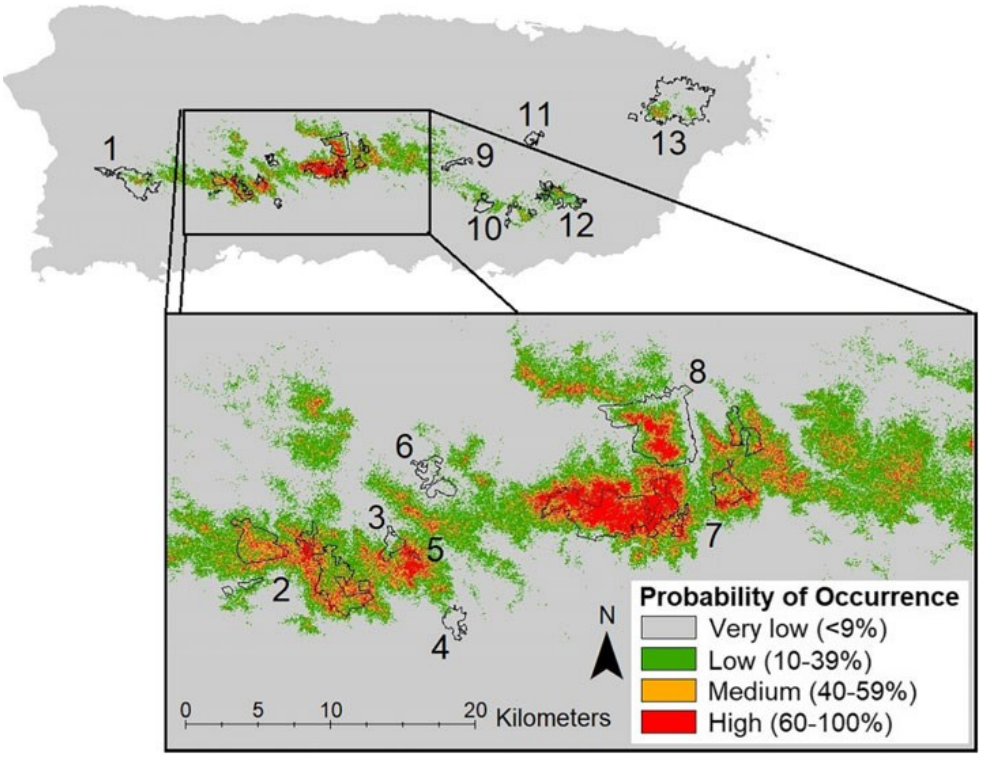

Figure 1. Predicted suitable habitat (2013–2016) for sharp-shinned hawks in Puerto Rico. Protected areas with occurrence probability > 10% include Maricao Forest (1), Guilarte Forest (2), Bosque la Olimpia (3), Mureño Protected Area (4), Foreman Conservation Easement (5), Bosque del Pueblo (6), Toro Negro Forest (7), Tres Picachos Forest (8), Cañon de San Cristobal Protected Area (9), Cerro Las Planadas Natural Reserve (10), Aguas Buenas Caverns Natural Reserve (11), Carite Forest (12), and El Yunque National Forest (13). Map based on a Habitat Suitability Model SSHA developed by Gallardo and Vilella 2017.

The distribution of the sharp-shinned hawk is limited to mature, dense-canopied, montane forests of Puerto Rico (Gallardo and Vilella 2017). Deforestation from human expansion and weather events such as Hurricane María have notably decreased the available forest land for the sharp-shinned hawk (Gallardo and Vilella 2017). The overall population of the sharp-shinned hawk has long been considered to be fragmented, with multiple isolated populations. A recent study also indicated that fledglings of the sharp-shinned hawk may travel as much as 28 kilometers (14.3 miles) from their home nest, meaning the species may be less isolated than previously assumed (Thorstrom et al. 2022).

Threats (Five-Factor Analysis) Summary

A detailed review of the species' threats can be found in the species listing rule, recovery plan, and the previous 5-year status review (Service Supporting Documentation (Appendix B). The primary threats to the Puerto Rican sharp-shinned hawk are the destruction, modification, or curtailment of its habitat (Factor A), disease/predation (Factor C), and hurricanes (Factor E).

Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range

Present or threatened destruction, modification, or curtailment of the habitat of the sharp-shinned hawk has long been understood to be one of the principal causes of the species' decline (Service 1994, 1997). The mature montane forests in which the sharp-shinned hawk resides are threatened by conversion of forest land to agricultural land, unsustainable agricultural practices, development of infrastructure, roads, and single homes, creation of recreational centers, and nature trail development (Wiley 1986; Service 1994, 1997; Dominguez-Cristobal 2000; Dominguez-Cristobal 2008, Weaver 2023, pers. comm.). Urbanization and urban sprawl also contribute to declining habitat for the sharp-shinned hawk. Deforestation as a result of power lines installation and maintenance, road construction, and other human expansion threatens to further decrease the amount of viable forestland for the sharp-shinned hawk.

The majority of the lands on which the sharp-shinned hawk resides are managed by PRDNER and USFS. Threats of destruction, modification, or curtailment of such habitats are lower on these managed and protected lands, but populations of the sharp-shinned hawks that live on private lands adjacent to such managed lands are at risk of further habitat loss.

Factor B: overutilization for commercial, recreational, scientific, or educational purposes

This factor is not considered an imminent threat to the species.

Factor C: disease or predation

The primary predatory or parasitic threats to the sharp-shinned hawk are the bot/nest fly (*Philornis* spp.), the red-tailed hawk (*Buteo jamaicensis jamaicensis*), and the pearly-eyed thrasher (*Margarops fuscatus*). Bot fly larvae are a major parasitic threat to the fledglings of the species, causing up to 69% of nest failures in the fledgling stage in MCF (Delannoy and Cruz 1991; Delannoy 1997). Fledglings are particularly susceptible to infestation, although adults, especially nesting females, also suffer from bot fly parasitism (Weaver pers. comm. 2023). Pearly-eyed thrashers prey on the eggs of the sharp-shinned hawk (Delannoy 1984, Delannoy 1997). Predation by red-tailed hawks has not been thoroughly studied, but instances of predation have been observed on fledglings as well as nesting females (Thorstrom et al. 2022). Predation by rats (*Rattus sp*.) also has been documented on a nestlings (Thorstrom et al. 2021).

Factor D: the inadequacy of existing regulatory mechanisms

The Migratory Bird Treaty Act of 1918 (hereafter MBTA; 16 U.S.C. 703-712) provides a significant degree of protection to the sharp-shinned hawk, which is classified as a migratory raptor under the MBTA. The MBTA explicitly declares it unlawful to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or

imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or egg of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such protected migratory bird. The MBTA provides many protections to the sharp-shinned hawk, however, habitat destruction is not prohibited unless it results in direct mortality of a protected bird, or their nest occurs.

Further territory-wide protections exist for the sharp-shinned hawk such as the New Wildlife Law of Puerto Rico (*Nueva Ley de Vida Silvestre de Puerto Rico*). This law is designed to protect and conserve native and migratory species on Puerto Rico, declare all wildlife species within the island as property of Puerto Rico, regulate hunting on the island, and to regulate exotic species, among other protections. In 2004, Puerto Rico also approved the Regulation to Govern the Management of Vulnerable and Endangered Species on the Commonwealth of Puerto Rico (*Regulation 6766; Reglamento para Regir el Manejo de las Especies Vulnerables y en Peligro de Extinción en el Estado Libre Asociado de Puerto Rico*). This law established for the listed species similar protections as those provided by the MBTA while also creating a requirement that any action that may affect the designated critical habitat of a listed species seek authorization by the secretary of the PRDNER (PRDNER 2004, 2016). In 2004 and 2016, the Puerto Rican sharp-shinned hawk was explicitly included in this aforementioned regulation as a "critically endangered" species.

The habitats of the sharp-shinned hawk also possess some protections under Puerto Rican law. The Puerto Rico Forest Act (Law No. 133-1975; *Ley de Bosques de Puerto Rico*) established rules regarding the maintenance, conservation, protection, and expansion of the forests of Puerto Rico and prohibits damaging or collecting flora and fauna within public forests. Furthermore, all commonwealth forests within Puerto Rico are also designated as Critical Wildlife Areas including those which have or are capable of hosting sharp-shinned hawk populations, such as the Maricao MCF, TNCF, GCF, CCF, and the Luquillo Mountains among others (PRDNER 2005).

Given the multitude of protections for the sharp-shinned hawk, these protections likely minimize the threat of purposeful killing of the species, and as previously discussed, many of the current nesting populations occur on managed and protected lands. Lack of enforcement of the aforementioned regulation has also not been identified as a serious issue to the survival of the sharp-shinned hawk.

Factor E: other natural or manmade factors affecting its continued existence

Lastly, hurricanes are a major threat to the survival of the sharp-shinned hawk. In addition to direct mortality of individuals, raptors are highly vulnerable to hurricane-induced habitat loss (Wauer and Wunderle 1992; Wunderle et al.1992). Hurricane María was of particular concern to the sharp-shinned hawk as it caused vegetation losses of 31% to 51% within its impact zone (Van Beusekom et al. 2017). Most of the damaged caused by Hurricane María was located on the eastern portion of the Cordillera Central, therefore, Toro Negro and Tres Picachos Forests were damaged more than Guilarte and Maricao Forests (Feng et al. 2018, Hall 2020). This impact to species available habitat also resulted in a significant reduction in connectivity among breeding populations (Gallardo and Vilella 2017). Although research completed after hurricane María found no strong relationship between post-fledgling female dispersal movements and the forest

disturbance intensity, suggesting that the species does tolerate some forest disturbance, it seems that the sharp-shinned hawk is still dependent on large tracts of protected forest for dispersal (Gallardo et al. 2022) because most of the recorded locations of the species were in areas with less than 60% of forest damage and elevations higher than 650 meters (m) (Gallardo et al. 2022). Since climate change is expected to result in an increases on intensity of extreme weather (tropical cyclones/hurricanes) (Intergovernmental Panel on Climate Change 2022), hurricanes continue to be a significant threat to the species.

Stochastic events associated to hurricanes and climate changes bring additional impacts to the species habitat, such as changes on temperatures and precipitation regimes. Precipitation is projected to decrease, influenced by warming, and it will tend to accelerate the hydrological cycles resulting in wet and dry extremes (Jennings et al. 2014; Cashman et al. 2010). In fact, precipitation is projected to decrease faster in wetter regions and the central mountains of Puerto Rico (Khalyani et al. 2016), were the sharp-shinned hawk mostly breeds. These changes in humidity and precipitation can result in a shift of life zones, even the disappearance of humid life zones (Khalyani et al. 2016). These shifts and its influence on the type of vegetation found in these high elevation forest might impact the species ability to breed by reducing its suitable habitat. This is exacerbated by the species specific biological requirements and narrow distribution.

Synthesis

The Puerto Rican sharp-shinned hawk is a subspecies of sharp-shinned hawk found nesting in the subtropical moist forest and the subtropical/lower montane wet forest of Puerto Rico. Available population survey data indicate a steady decline of the species up to the occurrence of Hurricane María, at which point its population declined precipitously to a low of 19 individuals. The most recent assessments (2018-2023) have documented an increase to 22-41 adults. The subspecies appears to have a small, fragmented population as a result of habitat loss, predation, parasitism, and hurricanes. Ongoing urbanization, conversion of forest land to cropland, and development of infrastructure (Factors A) are significant drivers of habitat loss of the sharp-shinned hawk. Hurricane María (Factor E) further compounded this ongoing habitat loss. Predation by the growing population of red-tailed hawks and pearly-eyed thrashers and parasitism by bot fly larvae (Factors C) have further stressed the species. Because of these continued and imminent threats and the limited population size, we believe that the species still meets the definition of an endangered species.

RECOMMENDED FUTURE ACTIVITIES

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 2019). In the course of this status review new and/or targeted potential recovery activities were identified and are included below.

Recovery Activities

- Impose limits on logging in or near areas of critical importance to the species.
- Work with local government, NGO's and non-profits to implement recovery and conservation measures for the sharp-shinned hawk.

- Repair/enhance damaged habitat left in the wake of Hurricane María.
- Reintroduce the species into locations it historically occupied.
- Continue supporting nest management activities to mitigate nest-fly parasitism in wild nests.
- Develop forest management plans focused on protecting and expanding healthy stands of Caimitillo forest
- Engage on large-scale double-clutching, propagation and release activities (8-15 nests).

Monitoring / Research Activities

- Monitor population size with annual surveys.
- Assess survival rate for this species.
- Develop a model to determine population-level effects of management activities.
- Assess relevant literature (e.g., Catanach et al. 2021) to determine if the sharp-shinned hawk warrants listing as a distinct species.
- Monitor and document species dispersal to better understand species connectivity between forests.
- Research and investigate the threat of rats on nesting success.

REFERENCES

Bildstein, K.L., K.D. Meyer, C.M. White, J.S. Marks, and G.M. Kirwan. 2020. Sharp-shinned Hawk (Accipiter striatus), version 1.0. *In* Birds of the World (S. M. Billerman, B. K. Keeney, P. G. Rodewald, and T. S. Schulenberg, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.shshaw.01

Cashman, A., Nurse, L., & John, C. 2010. Climate change in the Caribbean: The water management implications. The Journal of Environment and Development, 19, 42–67.

Castro-Prieto, J., J. M. Wunderle Jr., J. Salguero-Faría, S. Soto-Bayó, J. D. Crespo-Zapata, and W. A. Gould. 2021. The Puerto Rico Breeding Bird Atlas. USDA International Institute of Tropical Forestry General Technical Report IITF 53(168). 311 pp.

Catanach, T. A. M. R. Halley, J. M. Allen, J. A. Johnson, R. Thorstrom, S. Palhano, C. P. Thunder, J. C. Gallardo, and J. D. Weckstein. 2021. Systematics and conservation of an endemic radiation of Accipiter hawks in the Caribbean islands. Ornithology 138:1-23.

Delannoy, C. A. 1984. The Puerto Rican Sharp-shinned Hawk, Accipiter striatus venator: the ecology and breeding biology of a Neotropical island bird of prey. Ph.D. Dissertation. Univ. of Colorado, Boulder, Colorado.

Delannoy, C. A. 1997. Status of the broad-winged hawk and sharp-shinned hawk in Puerto Rico. Caribbean Journal Sciences 33: 21-33.

Delannoy, C. A., and A. Cruz. 1991. *Philornis* Parasitism and Nestling Survival of the Puerto Rican Sharp-shinned Hawk. *In* Bird-Parasite Interactions: Ecology, Evolution, and Behavior (J. E. Loy and M. Zuk, Editors). Oxford.

Domínguez-Cristóbal, C. M. 2000. Panorama histórico forestal de Puerto Rico. Editorial de la Universidad de Puerto Rico, San Juan, Puerto Rico. 680 pp. [Historical Forest Overview of Puerto Rico. University of Puerto Rico's Editorial]

Domínguez-Cristóbal, C. M. 2008. Apuntes en torno al establecimiento y desarrollo de un sistema de veredas interpretativas en los bosques o reservas naturales de Puerto Rico: 31 La presencia de la toponimia, la tenencia y usos de la tierra. Acta Científica 22 (1-3):99-103. https://data.fs.usda.gov/research/pubs/iitf/ja_iitf_2008_dominguez004_act_v22_1thru3.pdf

Gallardo, J. C., and F. J. Vilella. 2017. Conservation Status Assessment of the Sharp-Shinned Hawk, an Endangered Insular Raptor in Puerto Rico. Journal of Field Ornithology 88(4):349-61. https://www.jstor.org/stable/pdf/44994083.pdf

Gallardo, J.C, Weaver, H., and R. Thorstrom. 2022. Study II Hurricane Maria's effect on the regional connectivity of the Puerto Rican Sharp-shinned Hawk: developing tools for applied conservation management efforts. Performance Progress Report for Puerto Rico Department of Natural and Environmental Resources.

Integrated Taxonomic Information System (ITIS). 2023. *Accipiter striatus venator* Wetmore, 1914. https://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=824334#null. Accessed May 12, 2023.

Intergovernmental Panel on Climate Change. 2022: Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-33, doi:10.1017/9781009325844.001.

Jennings, N. L., Douglas, J., Treasure, E., & G. Gonzalez. 2014. Climate change effects in El Yunque National Forest, Puerto Rico, and the Caribbean Region. Gen. Tech. Rep. SRS-193. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 47 p.

Khalyani, A. H., Gould, W.A., Harmsen, E., Terando, A., Quinones, M., & J.A. Collazo. 2016. Climate change implications for tropical islands: interpolating and interpreting statistically downscaled GCM projections for management and planning. American Meteorological Society, 55, 265-282.

McClure, C. J. W., H. C. Weaver, M. Murillo, J. Gallardo, and R. Thorstrom. 2022. Breakeven points in nest management of an endangered island endemic raptor. Journal of Raptor Research 57(1):44-51. https://bioone.org/journals/journal-of-raptor-research/volume-57/issue-1/JRR-22-39/Breakeven-Points-in-Nest-Management-of-an-Endangered-Island-Endemic/10.3356/JRR-22-39.full

Puerto Rico Department of Natural and Environmental Resources (PRDNER). 2004. Regulation Governing the Management of Vulnerable and Endangered Species on the Commonwealth of Puerto Rico. Puerto Rico Commonwealth Department, Regulation 6766. PRDNER, San Juan, P.R. 60 pp.

Puerto Rico Department of Natural and Environmental Resources (PRDNER). 2005. Puerto Rico Critical Wildlife Areas. Project R-3.1. Bureau of Fish and Wildlife, Terrestrial Resources Division. 384 pp. https://www.drna.pr.gov/historico/oficinas/arn/recursosvivientes/costasreservasrefugios/pmzc/publicaciones/CWA_July2005.pdf

Puerto Rico Department of Natural and Environmental Resources (PRDNER). 2016. Reglamento para regir las especies vulnerables y en peligro de extinción en el Estado Libre Asociado de Puerto Rico. San Juan, PR. 238 pp.

Thorstrom, R. 2018. Puerto Rican Sharp-shinned Hawk 2018 Annual Report. The Peregrine Fund to the U.S. Fish and Wildlife Service as specified in permit no. TE61981B-O. 21 pp.

Thorstrom, R. 2019. Puerto Rican Sharp-shinned Hawk 2019 Annual Report. The Peregrine Fund to the U.S. Fish and Wildlife Service as specified in permit no. TE61981B-O.

Thorstom, R. 2021. Puerto Rican Sharp-shinned Hawk 2022 Annual Report. The Peregrine Fund to the U.S. Fish and Wildlife Service as specified in permit no. TE61981B-O. 22 pp.

Thorstom, R. 2022. Puerto Rican Sharp-shinned Hawk 2022 Annual Report. The Peregrine Fund to the U.S. Fish and Wildlife Service as specified in permit no. TE61981B-O. 67 pp.

Thorstom, R. 2023. Puerto Rican Sharp-shinned Hawk 2022 June Report. The Peregrine Fund to the U.S. Fish and Wildlife Service as specified in permit no. TE61981B-O. 2 pp.

Thorstrom, R. 2023. Personal communication. The Peregrine Fund to the Service regarding status and information of Puerto Rico sharp-shinned hawk and Puerto Rico broad-winged hawk on Puerto Rico. Received March-May 2023.

Van Beusekom, A. E.; G. González, and M.A. Scholl. 2017. Analyzing cloud base at local and regional scales to understand tropical montane cloud forest vulnerability to climate change. Atmospheric Chemistry and Physics 17(11): 7245–7259. https://doi.org/10.5194/acp-17-7245-2017.

U.S. Fish and Wildlife Service (Service). 1994. Endangered and threatened wildlife and plants; determination of endangered status for the Puerto Rican broad-winged hawk and the Puerto Rican sharp-shinned hawk. Federal Register 59(174):46710-46715.

U.S. Fish and Wildlife Service (Service). 1997. Puerto Rican broad-winged hawk and Puerto Rican sharp-shinned hawk (*Buteo platypterus brunnescens* and *Accipiter striatus venator*) Recovery Plan. Atlanta, Georgia. 23 pp.

U.S. Fish and Wildlife Service (Service). 2018. Puerto Rican sharp-shinned hawk or falcón de sierra (Accipiter striatus venator) 5-Year Review. Boquerón, Puerto Rico. 41 pp.

U.S. Fish and Wildlife Service (Service). 2019. Recovery Plan for Puerto Rican Broad-Winged Hawk (*Buteo platypterus brunnescens*) and Sharp-Shinned Hawk (*Accipter striatus venator*). Atlanta, Georgia. 9 pp.

Van Beusekom, A. E., N. L. Álvarez-Berríos, W. A. Gould, M. Quiñones, and G. González. 2018. Hurricane Maria in the U.S. Caribbean: Disturbance Forces, Variation of Effects, and Implications for Future Storms. Remote Sensing 10(9):1386. https://doi.org/10.3390/rs10091386

Wauer, R. H., and J. M. Wunderle Jr. 1992. The effect of Hurricane Hugo on bird populations on St. Croix, U.S. Virgin Islands. Wilson Bulletin 104:656-673. https://sora.unm.edu/sites/default/files/journals/wilson/v104n04/p0656-p0673.pdf

Weaver, H. 2023. Personal communication. The Peregrine Fund to the Service providing comments related to sharp-shinned hawk surveys and threats. Received June-August 2023.

Wiley, J. W. 1986. Habitat Change and its Effects on Puerto Rican Raptors. Birds of Prey Bulletin, No. 3 (1986): 51-56. http://www.raptors-international.org/book/birds_of_prey_1986/Wiley_1986_51-56.pdf

Wunderle, J. M. Jr. D. J. Lodge, and R. B. Waide. 1992. Short-term effects of Hurricane Gilbert on terrestrial bird populations in Jamaica. Auk 109: 148–166. https://sora.unm.edu/sites/default/files/journals/auk/v109n01/p0148-p0166.pdf

RESULTS / SIGNTUARES

U.S. FISH AND WILDLIFE SERVICE
Status Review of the Puerto Rican sharp-shinned hawk

Status Recommendation

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the ESA.

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist *(Indicate reasons for delisting per 50 CFR 424.11)*:
____ *The species is extinct*
____ *The species does not meet the definition of an endangered or threatened species.*
____ *The listed entity does not meet the statutory definition of a species.*
__X_ No change needed

FIELD OFFICE APPROVAL:

Field Supervisor, Caribbean Ecological Services Field Office, Fish and Wildlife Service

EDWIN MUNIZ Digitally signed by EDWIN MUNIZ
Date: 2023.08.11 07:41:24 -04'00'

Approve _____