

**Elfin-woods Warbler
(*Setophaga angelae*)**

**5-Year Review:
Summary and Evaluation**



Photo by Mike Morel

**U.S. Fish and Wildlife Service
South Atlantic–Gulf and Mississippi Basin Regions
Caribbean Ecological Services Field Office
Boquerón, Puerto Rico**

October 2022

5-YEAR REVIEW

Elfin-woods warbler (*Setophaga angelae*)

I. GENERAL INFORMATION

A. Methodology used to complete the review

The U.S. Fish and Wildlife Service (Service) completed this review using information obtained from the elfin-woods warbler (*Setophaga angelae*) final listing rule and designation of critical habitat under the Endangered Species Act (Act), the recovery outline, peer-reviewed scientific publications, several unpublished research project reports, unpublished field observations by the Service, State and other experienced biologists, and personal communications. On June 23, 2021, the Service published a notice in the Federal Register (84 FR 32965) announcing the initiation of the 5-year review for 37 southeastern species, including the elfin-woods warbler. At that time, the Service opened a 30-day comment period and requested new information concerning the biology and status of the species. No information was received from the public during the comment period. The Service prepared the 5-year review summarizing information that the Service has gathered in the species file since it was listed on June 22, 2016 (Service 2016a).

B. Reviewers

Lead Regional: Carrie Straight, Recovery Coordinator, Southeast Atlantic-Gulf and Mississippi-Basin Regions, Atlanta, Georgia.

Lead Field Office: Iván Llerandi-Román, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico, ivan_llerandi-roman@fws.gov.

C. Background

1. Federal Register Notice citation announcing initiation of this review

84 FR 32965; June 23, 2021

2. Listing history

Original Listing

Federal Register Notice: 81 FR 40534

Federal Register Notice date: June 22, 2016

Entity listed: Species

Classification: Threatened

3. Associated rulemakings

Critical Habitat

FR notice: 85 FR 39077

Date: June 30, 2020

4(d) Rule

Federal Register Notice: 81 FR 40534

Federal Register Notice date: June 22, 2016

4. Review History

This document represents the first status review for the species.

5. Species' Recovery Priority Number at start of review: 14

The recovery priority number was designated as 14 in the Recovery Outline (Service 2016b). The elfin-woods warbler was recognized as a species with a low degree of threat and a high recovery potential.

6. Recovery Plan

A Recovery Outline is available for the species (Service 2016b); however, at present, there is no final recovery plan approved for the species.

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

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 definition limits listing DPSs to only vertebrate species of fish and 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.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

The species currently has a Recovery Outline, no final recovery plan has been approved at the time of this writing.

C. Updated Information and Current Species Status

1. Biology and Habitat

Summary of new information of species biology and life history

Details of the species biology and life history can be found in the proposed and final listing rules (Service 2015 and 2016a, respectively). Information provided below specifically relates to the current status of the species.

a. Life History

Little detailed information has been published on the life history of the elfin-woods warbler. No new information has become available about the species' life history since the final listing rule.

b. Abundance, population trends, demography:

Details of past estimates of elfin-woods warblers is provided in the final listing rule (Service 2016a). Based on the past studies in MCF¹, in 2010 BirdLife International estimated the overall (island-wide) elfin-woods warbler population in Puerto Rico to be at least 1,800 mature individuals (Arendt et al. 2013). No formal assessment of the total number of individuals is available to determine if this estimate was correct or has changed in the last 12 years. Studies described below indicate potential declines in occupancy which is concerning.

El Yunque National Forest:

Kepler and Parkes (1972) estimated the elfin-woods warbler population at fewer than 300 pairs occurring in 450 ha (1,111 acres) at EYNF. Generally, numbers have appeared to decline since that time, with varying densities in different portions of EYNF, likely related to differences in habitat types (Waide 1995; Anadón-Irizarry 2006). Arendt et al. (2013) conducted bird surveys approximately monthly from 1989 to 2006 and reported a continuous decline of the elfin-woods warbler population in EYNF over that 17-year period of 17. Additionally, recent acoustic monitoring efforts have indicated a slight decrease in the number of occupied sites (Aide and Campos 2016), although how or if this reflects changes in total population is yet unclear. However, Aide and Campos (2016) suggested that if the current decline in site occupancy continues, it could result in a rapid decline in occupied sites over the next ten years.

Maricao Commonwealth Forest and adjacent lands:

Cruz and Delannoy (1984) suggested that the elfin-woods warbler was not uniformly distributed throughout the MCF. Following the occurrence of hurricane Maria in 2017, Aide and Campos (2018) conducted acoustic monitoring of the elfin-woods warbler in the MCF and concluded that pre- and post-hurricane numbers and spatial distribution were very similar, with no significant negative effect on the population by this atmospheric event.

c. Genetics:

There is no new or additional information regarding species genetics or any variations or trends in such at this time.

d. Taxonomic classification or changes in nomenclature:

There is no new information regarding taxonomic classification or changes in nomenclature for the elfin-woods warbler. Integrated Taxonomic Information System (ITIS) lists *Setophaga angela* as a valid species (ITIS 2022).

¹ Anadón-Irizarry (2006) conducted a survey from 2003 to 2004, in 102.4 ha (253 ac) of MCF and recorded 778 elfin-woods warblers in 18 counts for an average of 0.42 warblers/ha/count. González (2008) reported a population estimate for the elfin-woods warbler in various locations within the MCF and adjacent areas.

e. Distribution and trends in spatial distribution:

The elfin-woods warbler is endemic to Puerto Rico and was initially thought to occur only in the Luquillo Mountains in the El Yunque National Forest (EYNF) in eastern Puerto Rico (Kepler and Parks 1972; Pérez-Rivera 1979). The elfin-woods warbler is currently present in both the EYNF and the MCF and adjacent private lands, although it has formerly been reported also from the CCF and the Cordillera Central. However, over the past several years (i.e., 10-15) the species has not been detected in either the CCF or the Cordillera Central. Thus, it appears that the species is probably no longer present in the CCF (Anadón-Irizarry et al. 2017). Although the elfin-woods warbler has not been recently observed or otherwise detected in CCF (Anadón-Irizarry 2006, Aide et al. 2017, Anadón-Irizarry et al. 2017), we believe it still provides suitable habitat for the species due to its similarity in elevation, climatic conditions, and vegetation associations with both the EYNF and MCF.

Recent acoustic monitoring of the elfin-woods warbler in the EYNF (Aide and Campos 2016) suggest a slight decrease in the number of occupied sites. This acoustic monitoring also confirmed presence of the species on private lands adjacent to the MCF (Anadón-Irizarry et al. 2017, Aide and Campos 2018).

Accordingly, the species is currently known to occur in only two sites: the EYNF of northeastern Puerto Rico, and the MCF and vicinity in western Puerto Rico. Moreover, the large distance between these sites (approx. 125 km) combined with the presence of extensive areas of unsuitable (for the elfin-woods warbler) habitat between them means that these two populations will likely remain geographically and demographically isolated in the future.

f. Habitat or ecosystem conditions:

As we continue to learn more about the elfin-woods warbler and gain additional information for improved survey techniques for this species, we expect to gain a better understanding of its suitable habitat and habitat needs. For example, we originally thought the species was specifically tied to Dwarf Forest type, which is limited in quantity and distribution on the island. According to recent findings of elfin-woods warbler outside of that habitat by Aide and Campos (2016), the suitability and value of the Palo Colorado Forest type in the EYNF may be greater than previously believed. If so, this would be encouraging for the future of the species in the EYNF (Aide and Campos 2016), given that the Palo Colorado Forest occupies a much larger area (3,441 ha) than the Dwarf Forest (368 ha) (Weaver 2012).

2. Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

The purpose of a 5-Year Status Review is to recommend whether a listed taxon continues to warrant protection under the Act and, if so, whether it should be reclassified (from threatened to endangered or from endangered to threatened). This task requires that the analysis of the threats to the species be performed while

assuming that the species is not receiving the regulatory protections, funding, recognition, and other benefits of listing. Details of the threats to the species are provided in the listing rule (Service 2016a). The information provided below are provided to supplement that information and detail any new information since the listing.

a. Present or threatened destruction, modification, or curtailment of its habitat or range (Factor A):

Elfin-woods warbler continues to be threatened by habitat modification such as activities that require land clearing (e.g., timber harvest, sun coffee, other agriculture, transportation and communication infrastructure), and other conversion of lands to inappropriate habitat types.

The elfin-woods warbler has been documented from only four locations, two of which we have little information. Post-Hurricane Hugo studies in Toro Negro Forest did not detect the presence of this species. Portions of Dwarf or Elfin forests in both the MCF and the EYNF were destroyed for the construction of telecommunication towers. Any future expansion of these facilities would result in the elimination of additional habitat.

Elfin-woods warbler may migrate vertically, utilizing lower elevation areas where shade coffee plantations are found. Areas adjacent to the MCF, described as potential habitat for the species and previously planted in shade coffee, were converted to sun coffee plantations resulting in the elimination of this overstory and reducing the available wildlife habitat. Although the species has the ability to move to use alternate habitats, removal of certain habitat features like overstory trees, will likely result in declining use of some of those alternate habitats.

b. Overutilization for commercial, recreational, scientific or educational purposes (Factor B):

To our knowledge, the species has never been a target of the wild caged bird trade, and occupies habitats in relatively remote and inaccessible areas, we believe that overutilization for commercial, recreational, scientific or educational purposes is not currently considered a threat.

c. Disease or predation (Factor C):

The presence of recreational and communication facilities in the EYNF has led to a proliferation of feral animals, such as cats and dogs (*Canis familiaris*). These and other introduced species, such as rats (*Rattus* spp.), are potential nest predators of elfin-woods warbler because they prey upon eggs, young, and/or adults. Mongoose (*Herpestes auropunctatus*) is another non-native species that occurs in the habitats where elfin-woods warbler occurs. Although not expected to climb high into the trees to capture adults, they may be a predator on young birds with limited flight ability or on adults that move to the ground in search of food or water (Zimmerman et al. 2021). Although there are no records of predation by arboreal reptiles on eggs, juveniles, or adult elfin-woods warbler, the Puerto Rican boa (*Chilabothrus inornatus*), the red-tailed boa (*Boa constrictor*) and the green

anole (*Anolis cuvieri*) are found within the same habitat and are known to prey on other birds and their nests and, therefore, may prey upon the nests of elfin-woods warbler. Arroyo-Vázquez (1991) and Waide (1995) suggested that native species such as the pearly-eyed thrasher (*Margarops fuscatus*) and the sharp-shinned hawk (*Accipiter striatus*) might also prey upon the species. Moreover, recent episodes of avian predation of Puerto Rican parrots (*Amazona vittata vittata*) in the EYNF by migratory merlins (*Falco columbarius*; T. White, Service 2022, pers. obs.) suggests that merlins may also prey on other birds like elfin-wood warblers.

d. Inadequacy of existing regulatory mechanisms (Factor D):

As detailed in the final listing rule (Service 2016a), the elfin woods warbler is currently protected by both Commonwealth and Federal regulations. The elfin-woods warbler is currently protected by the Law # 241-1999 known as the “Nueva Ley de Vida Silvestre de Puerto Rico” (New Wildlife Law of Puerto Rico). The purpose of this law is to protect, conserve and enhance both native and migratory wildlife species; declare all wildlife species within its jurisdiction property of Puerto Rico; regulate permits, regulate hunting activities, and regulate exotic species among others. Article 5 of the Law prohibits collection and hunting of wildlife species within the jurisdiction of Puerto Rico without a permit from the Secretary of the Puerto Rico Department of Natural and Environmental Resources (DNER). Law #241-1999 also requires authorization from the Secretary of DNER for any action that may affect the habitat for the species.

In 2004, the Commonwealth of Puerto Rico adopted Regulation #6766 (“Reglamento para Regir las Especies Vulnerables y en Peligro de Extinción en el Estado Libre Asociado de Puerto Rico”) which regulates the management of threatened and endangered species in Puerto Rico (Departamento de Recursos Naturales y Ambientales (DRNA) 2004). Under Regulation #6766, the Commonwealth of Puerto Rico listed the elfin-woods warbler as a Vulnerable (VU) species, which is a species that, although not critically endangered, faces a high risk of extinction in the wild in the immediate future. Regulation #6766 prohibits collecting, killing, or harming listed species, as well as possessing, transporting, or selling items derived from listed species. Regulation #6766 also requires authorization from the Secretary of DNER for any action that may affect the habitat for the species.

The habitat and species within MCF is protected by Law #133-1975 (“Ley de Bosques de Puerto Rico” or The Puerto Rico Forest Law), as amended in 2000, which prohibits damage and collection of flora and fauna in public forests. The management plan for the MCF provides for the protection and conservation of species classified under DNER regulations as critical, threatened (vulnerable), or endangered (DNER 1976); elfin-woods warbler is classified as vulnerable by DNER.

Additionally, the species co-exists with other federally listed species such as the Puerto Rican sharp-shinned hawk (*Accipiter striatus venator*), the Puerto Rican boa, and several listed plant species which are subject to the protections under

sections 7 and 10 of the Act; therefore, the elfin-woods warbler may benefit from indirect protection.

The EYNF is managed by the U.S. Forest Service. The Caribbean National Forest Act of 2005 designated 10,000 acres within the forest as a component of the National Wilderness Preservation System to protect habitat for the elfin-woods warbler and the Puerto Rican parrot. The designation of the area as a wilderness area means that the habitat is protected, development is not permitted, and actions in this area require approval from the U.S. Forest Service. Additionally, the Puerto Rico's Planning Board designated a buffer zone surrounding this forest as a Special Planning Area to protect the forest from direct impacts due to development.

Based on the existence of local laws and regulations protecting this species, we believe that inadequacy of existing regulatory mechanisms should not be considered a threat. Although we do not know the reasons, declines in occupied areas mentioned earlier in this document occurred on protected lands, which indicates potential concerns that protection of lands may not be enough to halt some declines.

e. Other natural or manmade factors affecting its continued existence (Factor E):

Human Disturbance. Waide (1995) suggested that areas of high pedestrian use have fewer birds. Therefore, the expansion of trail or road systems or increased human use in either forest or on occupied private lands may pose a threat to the species. Urbanization around protected lands also has the potential to influence elfin-woods warbler through increasing invasive exotic species and potentially changing the habitat structure along the disturbed edges, and likely increasing numbers and access of predators associated with humans (e.g., feral cats, feral dogs, and rats) (Rojas-Sandoval et al. 2017, Zimmerman et al. 2021).

Hurricanes and Effects of Climate Change. Additional stressors impinging upon the demography of the elfin-woods warbler are local weather conditions and hurricanes. Catastrophic events such as hurricanes may affect the abundance and distribution of the elfin-woods warbler. Following Hurricane Hugo in 1989, Arroyo-Vázquez (1991) did not find any individuals in the Toro Negro Commonwealth Forest or in Luquillo. Waide (1995) stated that the abundance of elfin-woods warbler in the lower elevation forests of the Icacos Valley may be a temporary response to disturbance, given the severe damage incurred by the dwarf forest during Hurricane Hugo. This was observed again, during the months following hurricane Maria in September 2017, where elfin- woods warblers in the EYNF were observed foraging in areas much lower in elevation than normally observed for this species (J. Ilse 2018 pers. comm.).

Major hurricanes (> Category 2) can cause significant alterations to, and temporary loss of, optimal habitat for many avian species (White et al. 2005, Lugo 2008). In most such cases, habitats affected by hurricanes can quickly recover (Waide 1991, Wunderle 1999). Models identify increases in temperature,

intensity of extreme weather (e.g., tropical cyclones, hurricanes), storm surge, droughts, sea-level rise, and invasive species (Intergovernmental Panel on Climate Change (IPCC) 2022). Climate change also is expected to alter the plant community, structure and distribution of the habitat used by the elfin-woods warbler, and ecosystem processes, which may be particularly problematic for the species because of the limited distribution and specific forest types they use (Service 2016a). These evolving climatic trends may not only alter the habitat and food resources available to elfin-woods warbler, but they may also alter the post-hurricane recovery trajectories and ecology of the upper elevation habitats on which the species currently depends.

Natural and Human-caused Fire. Additionally, anthropogenic and natural forest fires commonly occur at the MCF, particularly during the dry season; and although reported fires have mostly occurred on the timber plantations of the lower slopes, if not contained these fires may directly or indirectly affect the population of the elfin-woods warbler. With increases in drought, fires on the landscape may also increase in intensity and occurrence.

Invasive Species. Invasive species has the potential to directly impact elfin-woods warblers through predation as described above under Factor C. They also have the potential to impact habitat for elfin-woods warbler by altering plant communities and forest structure. Increases in fine grasses or density of species can alter fire regimes potentially compounding the impacts of changing habitats and fires (D'Antonio and Vitousek 1992, Fusco et al. 2019, Zimmerman et al. 2021). Although EYNF is a protected natural area, it hosts numerous invasive species of plants and wildlife (e.g., feral cats, rats, and mongoose) that also have the capability to change the forest structure and directly impact elfin-woods warbler nests (eggs and young), recently fledged young/juveniles, and adults (Zimmerman et al. 2021).

D. Synthesis

The elfin-woods warbler is a small bird native to Puerto Rico. Current available information indicates that the elfin-woods warbler has a limited distribution, with only two known populations, one occurring within El Yunque National Forest and one in Maricao Commonwealth Forest and adjacent private lands. The Service currently considers the population from Carite Commonwealth Forest extirpated. The available information indicates that elfin-woods warbler populations appear to be stable in Maricao Commonwealth Forest but shows declining trends in El Yunque. We have no evidence to explain the declining trends. Records indicate that elfin-woods warbler also uses shade-grown coffee plantations, demonstrating that the species may tolerate some degree of habitat disturbance. The cumulative effects of habitat modification by human actions (e.g., unsustainable agricultural practices) and natural events such as hurricanes would make the two known populations more vulnerable to extinction due to their restricted distribution, limited population numbers, and specific ecological requirements.

Threats to the elfin-woods warbler include habitat loss, fragmentation, and degradation and urbanization of habitat (Factor A) on private lands where the species occurs. Moreover, the increase of urban development on private lands adjacent to protected

habitats also negatively affected suitable elfin-woods warbler habitat around these forests. Other natural or manmade factors (i.e., hurricanes, climate change, human-induced fires, invasive species; Factor E) also have been identified as threats to the species and altering the structure and distribution of their habitat. Elfin-woods warblers could experience local extinction as a result of catastrophic weather events such as hurricanes. Having two known elfin-woods warbler populations that are geographically separate may benefit the species to some degree minimizing the chance of a single catastrophic event from impacting both populations. However, the fact that there are only two known remaining populations makes the species more vulnerable to extinction if one is lost due to a catastrophic weather event. Based on the current information we believe that the elfin-woods warbler is not presently in danger of extinction throughout its entire range based on the low to moderate severity and non-immediacy of threats currently impacting the species and should still be considered as threatened.

III. RESULTS

Recommended Classification:

- Downlist to Threatened
- Uplist to Endangered
- Delist:
- No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIVITIES

- Establish additional Partner and Fish Wildlife agreements, in cooperation with Natural Resources Conservation Service with landowners near Maricao Commonwealth Forest and El Yunque National Forest to protect and enhance existing and potential elfin-woods warbler habitat.
- Promote conservation actions and sustainable practices of existing agriculture lands in areas where the warbler occurs near the Maricao Commonwealth Forest.
- Implement habitat restoration projects in coordination with NRCS, USFS and PR DNER to provide effective corridors for the elfin-woods warbler dispersal throughout the central mountains of Puerto Rico to help expand the current distribution of the species.
- Develop and implement a program to inform the public on the importance to protect the elfin-woods warbler and its habitat.
- Promote planting native trees to provide shade to coffee trees and control or removal of invasive non-native plant species that may be modifying suitable habitat for the elfin-woods warbler.
- Monitor success of recovery actions and use results to adapt management actions.
- Promote the development of a human-induced fire prevention plan for the areas occupied by the species in Maricao.
- Promote research that forecast the elfin-woods warbler's vulnerability and response to climate change.

V. REFERENCES

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Elfin-woods warbler (*Setophaga angelae*)

Current Classification: Threatened

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 Act.

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Review Conducted By: Iván Llerandi-Román, Caribbean Ecological Services Field Office.

APPROVALS

FIELD OFFICE APPROVAL

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

Approve _____

REGIONAL OFFICE APPROVAL:

For Assistant Regional Director – Ecological Services, Fish and Wildlife Service

Approve _____