

# U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

## Scientific Name:

Dendroica angelae

## Common Name:

elfin-woods warbler

## Lead region:

Region 4 (Southeast Region)

## Information current as of:

06/20/2013

## Status/Action

Funding provided for a proposed rule. Assessment not updated.

Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

New Candidate

Continuing Candidate

Candidate Removal

Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status

Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species

Range is no longer a U.S. territory

Insufficient information exists on biological vulnerability and threats to support listing

Taxon mistakenly included in past notice of review

Taxon does not meet the definition of "species"

Taxon believed to be extinct

Conservation efforts have removed or reduced threats

\_\_\_ More abundant than believed, diminished threats, or threats eliminated.

## **Petition Information**

\_\_\_ Non-Petitioned

X Petitioned - Date petition received: 05/11/2004

90-Day Positive:05/11/2005

12 Month Positive:05/11/2005

Did the Petition request a reclassification? **No**

### **For Petitioned Candidate species:**

Is the listing warranted(if yes, see summary threats below) **Yes**

To Date, has publication of the proposal to list been precluded by other higher priority listing?  
**Yes**

Explanation of why precluded:

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for this species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The Progress on Revising the Lists section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

### **Historical States/Territories/Countries of Occurrence:**

- **States/US Territories:** Puerto Rico
- **US Counties:** Maricao, PR, Rio Grande, PR
- **Countries:**Country information not available

### **Current States/Counties/Territories/Countries of Occurrence:**

- **States/US Territories:** Puerto Rico
- **US Counties:** Cayey, PR, Las Marias, PR, Luquillo, PR, Maricao, PR, Rio Grande, PR
- **Countries:**Country information not available

### **Land Ownership:**

The species has been found in Federal and Commonwealth forests and private lands: the Maricao, Toro Negro, and Carite Commonwealth Forests, managed by the Puerto Rico Department of Natural and Environmental Resources (DNER), and El Yunque National Forest, managed by the U.S. Forest Service. *Setophaga angelae* also has been found in private lands adjacent to these forests.

### **Lead Region Contact:**

## **Lead Field Office Contact:**

CARIBBEAN ESFO, Jose Cruz-Burgos, 787 851-7297, jose\_cruz-burgos@fws.gov

## **Biological Information**

### **Species Description:**

*Setophaga angelae* (elfin-woods warbler) is about 12.5 cm (4.9 in) in length, and entirely black and white. Adults have a thin, white eyebrow stripe, white patches on ear-covers and neck, incomplete eye ring, and black crown. Immature birds are similar to the adult, but black is replaced by grayish-green on the back, and yellowish-green on the head and underparts (Raffaele et al. 1998, p. 168).

### **Taxonomy:**

*S. angelae* was discovered in 1971 by Angela and Cameron Kepler from the Elfin, or Dwarf, forest type of the El Yunque National Forest in the Luquillo Mountains. Kepler and Parkes (1972, pp. 3-5) described it as a valid taxon.

### **Habitat/Life History:**

Kepler and Parkes (1972, p. 5-6) described the elfin-woods warbler from the high elevation Elfin Woodland forests (640 to 1,030 m) (2,099 to 3,378 ft), and occasionally from the Palo Colorado forests in El Yunque National Forest. El Yunque National Forest is managed by the U.S. Forest Service. It covers approximately 11,300 ha (27,911 ac), with elevations ranging from 100 to 1,075 m (328 to 3,526 ft). The Elfin forest is found on the summits of mountains, and it is composed of dense stands of short, small diameter, twisted trees and shrubs. Mosses and epiphytes cover the plants and forest floor. The area is characterized by high rainfall (annual average of 453.3 cm [178.5 in]), high humidity, low solar insulations, low temperatures, and constant winds. Wiley and Bauer later (1985, p.12) reported the species from the Elfin forests at lower elevations (370 to 600 m (1,213 to 1,968 ft)) such as Palo Colorado and Sierra Palm forests in the El Yunque National Forest. Based on surveys conducted in 1989 and 1990, Arroyo-Vázquez (1991, p. 56) suggested that the species migrates vertically in elevation. In addition, the species seems to move towards the north facing valleys during the months of heaviest rainfall.

The elfin-woods warbler was also reported from the Maricao Commonwealth Forest, located in the Cordillera Central, western Puerto Rico. This forest is comprised by a mixture of mature native trees and abandoned shade coffee and woodland plantations. It covers approximately 4,150 ha (10,250 ac) and overlies serpentine derived soils, low in water holding capacity, and low in fertility, resulting in more xeric vegetation than might be expected given the amount of annual rainfall (235 cm [92.5 in]). Vegetation types are described as dry slope forest, slope forest, mixed hardwood, exposed ridge woodland (Elfin forest), and Podocarpus (Caobilla) mixed woodland (DNER 1976, p. 185). In the Maricao Commonwealth Forest, the species is found in a variety of habitats, including disturbed sites, in elevations ranging from 650 to 900 m (2,132 to 2,952 ft) (Cruz and Delannoy 1984a, p. 90). These authors described the species from the Los Viveros area, where there is a Podocarpus-mixed woodland forest with a continuous canopy at 15 to 20 m (49.2 to 65.6 ft). The Rosario Alto and Campamento Santana sites have a mixture of plantations (*Eucalyptus robusta* and *Calophyllum calaba*), and Elfin forest (i.e. Podocarpus) on the ridges.

Delannoy (2007, p. 9) sampled four forest types within the Maricao Commonwealth Forest: Podocarpus forest (80 ha [197.7 ac]), exposed woodlands (2,711 ha [6,699 ac]), plantation (1,111 ha [2,745]), and dry

slope forest (1,367 ha. [3,378 ac]). The structure among forest types was very similar with extensive canopy cover and similar canopy heights, although plantation forest averaged significantly lower canopy height. The highest canopy was found in the dry-slope forest. Stem density was relatively high among forest types, but significantly higher in the dry-slope forest. All DBH classes (diameter at breast height; the outside bark diameter at breast height), with the exception of DBH class of 6.4-12.0 cm (2.52-4.72 in), were larger in the dry slope forest.

Although the structure among forest types was very similar, Delannoy (2007, pp. 14-18) reported statistically-significant differences in elfin-woods warbler abundance among the four primary forest types sampled. The highest abundance of elfin-woods warbler was found in the Podocarpus forest within the Maricao Commonwealth Forest. The author did not provide reasons for these differences, but recommended additional studies on habitat selection and food resources for the implementation of effective management strategies (Delannoy 2007, p.26). The species forages in the middle part of trees, gleaning insects from leaves in the outer portion of the tree crown (Cruz and Delannoy 1984b, p. 155). Information related to the breeding biology of this species is limited. The breeding season extends from March to June (Raffaele et al. 1998, p. 406). Elfin-woods warblers build a compact cup nest, usually close to the trunk and well hidden among the epiphytes of small trees. Nests are associated with aerial leaf litter, which is unique among wood warblers, and is placed at moderate heights (1.3-7.6 m (4.3-24.9 ft)) above the ground (Wood 1992, p. 3). Rodriguez-Mojica (2004, p. 21) found one elfin-woods warbler nest with four hatchlings in a tree cavity of Palo Colorado (*Cyrilla racemiflora*) in the Maricao Commonwealth Forest.

### **Historical Range/Distribution:**

The elfin-woods warbler is endemic to Puerto Rico and has been reported in humid montane forest habitats. Although it was initially thought to occur only in the Luquillo Mountains (El Yunque National Forest), the species was later discovered in the Maricao, Toro Negro, and Carite Commonwealth forests (Gochfeld et al. 1973, p. 231; Cruz and Delannoy 1984a, p. 92; Raffaele et al. 1998, p. 406).

### **Current Range Distribution:**

Once found in four sites, it is now restricted to two populations; one in the Maricao Commonwealth Forest (western Puerto Rico), and one in the El Yunque National Forest (eastern Puerto Rico). Both forests are located about 145 km apart. Arroyo-Vazquez (1991, p. 55) did not find the elfin-woods warbler at the Toro Negro Forest during surveys conducted following Hurricane Hugo in 1989. In 2003 and 2004, Anadon-Irizarry (2006, p. 34) conducted surveys for the elfin-woods warbler in the Carite, Toro Negro, Guilarte, Bosque del Pueblo, Maricao Commonwealth forests, and El Yunque National Forest, but only detected the species in the latter two. Delannoy (2007, p. 5) surveyed the Susua Forest and visited the Toro Negro Forest for more than 30 years after elfin-woods warblers were discovered in these forests but did not detect the species.

The elfin-woods warbler is not evenly distributed within the Maricao Commonwealth Forest and El Yunque National Forest (Anadon-Irizarry 2006, p. 23). In Maricao, even though the species is found in several habitat types, it is most abundant in Podocarpus Forest type at elevations from 601-900 m (1,972- 2, 953 ft). The Podocarpus forest type comprises about 80 ha (198 ac) or 1.9% of the forest area. Although the range of this species extends outside the Maricao Forest boundaries into adjacent private lands, Delannoy (2007) and Anadon-Irizarry (2006) described a reduction trend in abundance with decreasing elevation. The species distribution at El Yunque National Forest revealed that it is concentrated more in the Palo Colorado (0.48 per point count station) and Elfin (0.42 per point count station) forests than Tabonuco (0.01) and Sierra Palm forests (0) (Anadon-Irizarry 2006, p. 24).

### **Population Estimates/Status:**

Maricao Commonwealth Forest:

Cruz and Delannoy (1984a, p. 92) reported the highest densities in the Maricao Commonwealth Forest at Los Viveros (20.9 individuals/ha [51.6/61.7 ac]), and significantly lower densities at Rosario Alto (3.0/25 ha [7.4/61.7 ac]) and Campamento Santana (1.2/25 ha [2.9/61.7 ac]). Waide (1995, p. 9) found the highest densities of elfin woods warbler in Puerto Rico in the Maricao Commonwealth Forest (20.9 individuals/ha). Anadón-Irizarry (2006, p. 27) surveyed 102.4 ha (253 ac) of habitat in the Maricao Commonwealth Forest and recorded 778 elfin-woods warblers in 18 counts for an average of 0.42 warblers/ha/count (1 warbler/acre/count). Podocarpus forest had the highest density, and the dry slopes the lowest. Delannoy (2007, p. 13) did not estimate the overall number of individuals in the Maricao Commonwealth Forest and adjacent properties, but provided an average elfin-woods warbler abundance per point-count station. Of the 127 point count stations located within the Maricao Commonwealth Forest, 106 (83.5%) yielded positive results for presence of elfin-woods warbler. Of the 234 point count stations located in lands adjacent to the Maricao Commonwealth Forest, only 58 (24.8%) yielded positive results for elfin-woods warbler presence. Gonzalez (2008, p. 16-18) determined the abundance of elfin-woods warblers in habitats of the Maricao Commonwealth Forest and adjacent areas. As with previous studies, species abundance was highest in Podocarpus forest (1.41 individuals per point count station), and lowest in dry adjacent forest (0.01 individuals per point count station). The species was not recorded in un-shaded coffee plantations. Within the Maricao Forest, Gonzalez (2008, p. 18) estimated 97.67 elfin-woods warblers in a 203.2 ha/count (502 acres/count) sampling area; whereas in areas adjacent to the Maricao Commonwealth Forest, he estimated 43.02 elfin-woods warblers in a 374.4 ha/count (925 acres/count) sampling area. Based on the above studies, the Maricao Commonwealth Forest sustains the highest number of elfin woods warblers per hectare (acre). Delannoy (2007, p. 24) stated that the Maricao Commonwealth Forest population is currently thriving, and there is no indication that these populations are declining in numbers.

#### El Yunque National Forest:

Kepler and Parkes (1972, p. 15) estimated the El Yunque National Forest elfin-woods warbler population at fewer than 300 pairs. Waide (1995, p. 9) estimated 138 pairs of elfin-woods warbler in El Yunque National Forest using an area of Elfin woodland (329 ha [813 ac]). Anadón-Irizarry (2006, p. 27) surveyed 155.2 ha (383.5 ac) of upland woods habitat in El Yunque National Forest, and recorded 196 elfin-woods warblers in seven counts for an average of 0.18 warblers/ha/count (0.45 warblers/acres/count). The Palo Colorado had the highest density with 0.30 warblers/ha/count. The population from El Yunque National Forest population experienced a decline from 1989 to 2006, according to one recently published paper (Arendt et al., 2013, p.1). Density estimates show a significant declining trend in recent years from 0.2 individuals/ha in 1989 in elfin woodland to .02/ha in 2006 (approximately 80% decline), and from 1 to 0.2 in the Palo Colorado forest, a decline of nearly 50% (Arendt et al., 2013, p.6). If this declining trend continues, it may lead to local extirpation of the species in El Yunque National Forest, one of the two remaining populations.

#### **Distinct Population Segment(DPS):**

We have sufficient information on biological vulnerability to list the elfin-woods warbler as a species.

## **Threats**

### **A. The present or threatened destruction, modification, or curtailment of its habitat or range:**

Prime habitats for the elfin-woods warbler within Elfin and Podocarpus forests are essential for maintaining "healthy" populations (Delannoy 2007, p. 24). Delannoy (2007, p. 21) stated that within the Maricao Commonwealth Forest there are strong and continuous pressures to cut and replace Podocarpus forest for the development of infrastructure for the communications industry and for the expansion of recreational facilities and trails within the forest. The Maricao Commonwealth Forest has several private and government inholdings with communication towers and recreational facilities. Around 2004, about 4 ha (9.9 ac) of Podocarpus forest habitat, the equivalent of about four to five elfin-woods warbler territories, were cleared to

create a picnic area; and in 2009, about 12 ha (29.6 ac) of Podocarpus forest were cleared to expand a camping ground, possibly eliminating 10-12 elfin-woods warbler territories (C. Delannoy, UPRM, pers comm. 2009). Waide (1995, p.17) suggested that areas of high pedestrian use have fewer birds. Therefore, the expansion of trail or road systems in either forest, or the increased use of those presently existing, pose a threat to the species.

Despite protections provided to El Yunque National Forest (see Factor D analysis below), the protection of adjacent lands is still a concern. A study of a disturbed site in the Luquillo Mountains found that although 23 woody species were present after 18 years of recovery, the site would take approximately 200 years to fully recover to habitat suitable for the species (Weaver 1990, p. 83).

Although the Puerto Rico Planning Board designated a buffer zone surrounding the El Yunque National Forest as a Special Planning Area, the habitat within the buffer zone and adjacent areas has experienced modification from the construction of residential projects. In the last decade we have provided technical assistance to the Puerto Rico Planning Board on at least three large-scale residential projects in the area. If residential development continues, the transitional habitat found on lands adjacent to El Yunque National Forest, and used by the species for altitudinal migration, will become scarce.

Elfin-woods warbler is also known to use lower elevation forested areas such as shade coffee plantations adjacent to the Maricao Commonwealth Forest. These areas have been identified as potential suitable habitat for the species. However, the conversion of shade coffee plantations into sun coffee has resulted in the elimination of the over story, decreasing the value of this habitat for wildlife, including the elfin-woods warbler. During his study on privately-owned lands adjacent to the Maricao forest, Delannoy (2007, p. 15) did not detect the presence of elfin-woods warblers in sun coffee plantations, while in shade coffee plantations he found the highest abundance of the species (average of 0.35 of elfin-woods warbler per point count) on lands outside the forest. Commonwealth and Federal incentive programs promote the cultivation of shade coffee for better and higher longevity coffee plants, the control of sedimentation and erosion, and pest control. However, incentive programs are completely voluntary, and farmers have continued producing sun coffee and expanding cultivation into potential elfin-wood habitat adjacent to the Maricao Commonwealth Forest. The cultivation of sun coffee has not been abandoned in Puerto Rico and continues to be a common agricultural practice in the Coffee Region of Puerto Rico, including Maricao. Several sun coffee plantations are currently being converted to shade coffee plantations, which provide better habitat for wildlife species, including the elfin-woods warbler. Nevertheless, this conversion will take a few decades before full restoration to shade coffee plantations is complete.

Based on the above discussion, we determined that the present or threatened destruction, modification, or curtailment of habitat or range is a threat to the elfin-woods warbler.

## **B. Overutilization for commercial, recreational, scientific, or educational purposes:**

These factors have not been documented as threats to elfin-woods warbler.

## **C. Disease or predation:**

Delannoy and Cruz (1999, p. 43) mentioned that the Puerto Rican sharp-shinned hawks (*Accipiter striatus venator*) infrequently prey on elfin-woods warbler. Waide (1995, p.10) suggested that native bird species such as the pearly-eyed thrasher (*Margarops fuscatus*) may prey upon the species. Other potential egg and nestling predators includes the Puerto Rican Tanager (*Nesospingus speculiferus*), Puerto Rican Screech Owls (*Mefascops nudipes*), Puerto Rican Boa (*Epicrates inornatus*), Puerto Rican racer (*Alsophis portoricensis*) and Feral cats (*Felis catus*) (Delannoy 2009), although no data are available documenting these threats. Thus, based on the above information, we do not consider predation to be a threat to the species, at this time.

## **D. The inadequacy of existing regulatory mechanisms:**

The elfin-woods warbler is currently protected by the Law No. 241-1999, also known as the "Nueva Ley de Vida Silvestre de Puerto Rico" (New Wildlife Law of Puerto Rico) approved in 1999 by the Commonwealth 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 this law prohibits collection and hunting wildlife species within the jurisdiction of Puerto Rico without a permit from the Secretary of the Department of Natural and Environmental Resources (DNER). Law No. 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 No. 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. The elfin-woods warbler was listed as vulnerable (VU) under Regulation No. 6766. A VU classification is assigned to a species that is not critically endangered or endangered, but faces a high risk of extinction in the wild in a medium timeframe. A "vulnerable" status is equivalent to the "threatened" status of the Endangered Species Act. Regulation No. 6766 prohibits collecting, killing, or harming listed species, as well as possessing, transporting, or selling items derived from listed species. Regulation No. 6766 also requires authorization from the Secretary of DNER for any action that may affect the habitat for the species.

Furthermore, the Maricao Commonwealth Forest is protected by Law No. 133-1975, as amended ("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 Maricao Commonwealth Forest provides for the protection and conservation of species classified under DNER regulations as critical, vulnerable (threatened), or endangered (DNER 1976, p.3). In fact, the 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, the Puerto Rican boa, and several listed plant species which are subject to the protections of the Endangered Species Act. Therefore, the elfin-woods warbler may benefit from indirect protection. This species also was included in the DNER State Wildlife Action Plan (DNER 2005a, p. 26). In addition, all Commonwealth forests are designated as Critical Wildlife Areas (CWA) by the Commonwealth of Puerto Rico. The CWA designation constitutes a special recognition by the Commonwealth with the purpose of providing information to Commonwealth and Federal agencies about the conservation needs of these areas and assisting permitting agencies in precluding negative impacts as a result of permit approvals or endorsements (DNER 2005b, p. 6).

El Yunque National Forest is managed by the U.S. Forest Service. The Caribbean National Forest Act of 2005 designated 4,046.8 ha (10,000 ac) within El Yunque National Forest as a component of the National Wilderness Preservation System to protect habitat for the elfin-woods warbler and the Puerto Rican parrot (*Amazona vittata vittata*). The Wilderness Area includes some of the Elfin, Tabonuco and Palo Colorado forest types. The designation of the area as a wilderness means that the habitat is protected, development is not permitted, and actions in this area require approval from the U.S. Forest Service.

As indicated under Factor A, in the Maricao Commonwealth Forest and adjacent lands there are pressures to cut and replace Podocarpus forest for development of infrastructure for the communications industry, and for the expansion of recreational facilities and trails (Delannoy 2007, p. 21). Expansion of these facilities would have a direct impact on the elfin-woods warbler because the species occurs within the Podocarpus forest type. Nonetheless, there is a special regulatory process for the establishment of communication facilities within Commonwealth forests (Regulation No. 4745 of 1992), which requires consideration of those species classified as critical elements, including species designated as vulnerable by the Commonwealth, as well as federally listed species.

As previously stated, there are Federal and Commonwealth regulatory mechanisms that provide protection to the elfin-woods warbler and its habitat. Furthermore, although the species is not federally-listed, it co-exists with other federally-listed species that are protected under both Federal and Commonwealth regulations.

However, despite these regulatory mechanisms, habitat modification still exists within the Maricao Commonwealth Forest, and adjacent private lands adjacent to both the Maricao Commonwealth Forest and El Yunque National Forest. Furthermore, shade coffee plantation may be converted into sun coffee without overview of natural resources agencies. Agricultural practices are exempt from compliance with DNER regulations. Therefore, we consider that inadequacy of existing regulatory mechanisms to be a threat to the elfin-woods warbler, as enforcement remains a challenge and existing regulatory mechanisms do not apply to agriculture lands.

## **E. Other natural or manmade factors affecting its continued existence:**

### Hurricanes

Catastrophic events such as hurricanes affect the abundance and distribution of the elfin-woods warbler. Arroyo-Vazquez (1991, p. 55) surveyed the Toro Negro and Carite Commonwealth forests after Hurricane Hugo in 1989 and did not detect the species. Tossas (2006, p. 84) found that the elfin woods warbler in Maricao Commonwealth Forest was one of three bird species that, after Hurricane Georges in 1998, decline in capture rates to zero. Nevertheless, the species recovered within a year to pre-hurricane population levels; suggesting that the warblers abandoned defoliated sites immediately after the hurricane and shifted to protected patches with adequate foraging substrate and prey until the defoliated sites recovered. It is possible that small populations of elfin-woods warbler may experience local extinction with these catastrophic events. More surveys are necessary to assess the impact of these events on habitat-use patterns of the species. There are no studies on the effects of hurricanes on the species habitat either. However, hurricanes have affected the composition of elfin-woods warbler habitat, and thus, degrade the habitat quality, particularly for the species in at El Yunque National Forest (Arendt et al., 2013, p.9). Thus, we believe that hurricanes are a current threat to the elfin-woods warbler.

### Limited distribution

At the present time, the species is only known from two disjunctive areas of Puerto Rico. The El Yunque National Forest population represents approximately 38% of the total population and it has recently undergone a significant decline (Arendt et al., 2013, p.1); if this trend continues it could result in local extirpation, limiting the species just to the Maricao Commonwealth Forest. Thus, the effects of other natural and manmade factors could be exacerbated (as there would only be one population to sustain the effects).

Based on the above, other natural or manmade factors such as hurricanes may threaten the continued existence of the elfin-woods warbler.

## **Conservation Measures Planned or Implemented :**

Scientists from the University of Puerto Rico, Mayagüez Campus, and the U.S. Forest Service have conducted studies on the abundance and distribution of elfin-woods warbler at various forests, and have reported observations on several aspects of the biology of the species.

A student from the University of Puerto Rico, Mayagüez Campus, is conducting a study on the abundance and distribution of elfin-woods warbler potential prey at the Maricao Commonwealth Forest.

The Service continues to provide technical assistance to local agencies and private citizens on non-federal projects to curtail impacts to this species and its habitat (e.g., location of telecommunication towers).

The ESA Section 7 consultation process furthers the recovery of this species through the review of communication towers siting permits and federally-sponsored projects.

The Caribbean Ecological Services Field Office's Partners for Fish and Wildlife (PFW) program initiated a conservation initiative with private landowners in 2007 to conserve and enhance approximately 81 ha (200 ac) of habitat within a radius of five miles from the Maricao Commonwealth Forest, where the elfin-woods warbler has been documented nesting recently in shaded coffee plantations, and other abandoned agricultural lands. In cooperation with EnviroSurvey, Inc., between 2007 and 2011 the total of restored upland habitat

increased to 140.4 ha (347 ac). In addition, 5.17 km (3.21 mi) of riparian buffer were restored. In 2010, the USDA Natural Resources Conservation Service (NRCS), in cooperation with the Caribbean Ecological Services Field Office's PFW program, the Department of Natural and Environmental Resources, and Envirosurvey, Inc., began working on an initiative to restore 263.4 ha (651 ac) in 17 private properties between the Maricao and Guanica Commonwealth Forests.

In addition to the currently implemented conservation measures, the Service is working on a Candidate Conservation Agreement with the U.S. Forest Service for additional benefit to the species.

In July 2011, the Puerto Rican Ornithological Society (Sociedad Ornitológica Puertorriqueña, Inc.) (SOPI), in collaboration with BirdLife International and the Service, started the project Searching for a third population of the elfin-woods Warbler. This project integrates a patch occupancy approach with a stratified random sampling strategy. The sampling units are based on an elfin-woods warbler habitat suitability model. This habitat suitability model was prepared using vegetation classification and elevation variables for Puerto Rico (R. Colón, USFWS, unpubl. data). This project consists of searching for a third population in the central mountains and defining the current distribution of the species within the Marico Commonwealth Forest. The presence of additional healthy/viable populations of the elfin-woods warbler in other regions of Puerto Rico would be significant for its conservation, and will facilitate the development of conservation actions for the species. In addition, this project will validate and improve the predictive habitat model used, that will be used for prioritizing future conservation actions.

## **Summary of Threats :**

The elfin woods warbler is a species with a limited distribution, a declining trend in El Yunque Nation Forest and is threatened by habitat modification (Factor A), lack of enforcement of regulatory mechanisms (Factor D), and the effects of hurricanes (Factor E). While there is an effort to convert sun-coffee into shade-coffee plantations, the habitat restoration resulting from the conversion may take decades, and there are still sun-coffee farms adjacent to the Maricao Commonwealth Forest with the potential to expand into elfin-woods warbler habitat. Conversion of elfin-woods warbler habitat of better quality (e.g., mature secondary forests, young secondary forests, and shade-coffee plantations) along the periphery of the Maricao Commonwealth Forest to marginal habitat (e.g., pastures, dry slope forests, residential rural forests, gallery forests, and un-shaded coffee plantations) may result in ineffective corridors for dispersal and expansion of the elfin-woods warbler.

Furthermore, although the Puerto Rico Planning Board designated a buffer zone surrounding El Yunque National Forest as a Special Planning Area to minimize the effects of urban encroachment on this forest, the habitat within the buffer zone and adjacent areas continue experiencing modification from urban development. Hence, although there are laws and regulations protecting the species and habitat within the Maricao and El Yunque forests, habitat modification still is a concern as enforcement of these law and regulations is a challenge, particularly on private lands inside (inholdings) the forests and areas adjacent to the forests (Factor D). Other natural or manmade factors such as hurricanes may also modify the elfin-woods warbler habitat (Factor E). However, there are no studies on the effects of hurricanes on the species habitat. Therefore, the present or threatened destruction, modification, or curtailment of habitat or range; the inadequacy of existing regulatory mechanisms; and other natural and or manmade factors such as hurricanes are currently considered threats to the elfin-woods warbler.

At present, the species is only known from two disjunctive areas of Puerto Rico, and the latest trend in El Yunque National Forest is reported as declining. The El Yunque National Forest population represents 38% of the total population, if the declining trend reported in 2006 continues this could lead to loss of genetic diversity in the whole population and the complete loss of one of two remaining populations. The loss of genetic diversity may decrease the chances of recovery of the species. We believe that overall the threats are high in magnitude. Nevertheless, most of the elfin-woods warbler occupied habitat still present within the Maricao and El Yunque National Forest. Furthermore, at the present time there is not up to date information regarding the overall status of the species. We believe that the threats are non-imminent.

## **For species that are being removed from candidate status:**

\_\_\_\_\_ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

## **Recommended Conservation Measures :**

The conservation of the Podocarpus forest type within the Maricao Commonwealth Forest is critical and essential for the survival of the species (Delannoy 2007, pp. 24-25).

Degraded lands should be restored with species such as Maria (*Calophyllum calaba*; Delannoy 2007, pp. 24-25).

Continue protecting shade coffee habitats and restoring sun coffee into shade coffee plantations adjacent to elfin-woods warbler habitat in the Maricao Commonwealth Forest.

Additional habitat restoration projects are needed to provide effective corridors for elfin-woods warbler dispersal throughout the central mountains of Puerto Rico.

Work jointly with DNER and Forest Service on the development and implementation of policies to not allow elfin-wood warbler habitat destruction from construction of new telecommunication towers or expansion of the existing ones.

Develop an elfin-wood warbler habitat suitability map for the entire range of the species in Puerto Rico.

Develop a distribution map of the elfin-wood warbler population within the El Yunque National Forest and the Maricao Commonwealth Forest.

Determine if the species is found outside of El Yunque National Forest boundaries.

If the species is found outside the El Yunque National Forest boundaries, develop and implement a Candidate Conservation Program with private landowners adjacent to El Yunque National Forest for the restore suitable habitat for the elfin-wood warbler.

Develop a habitat restoration effort for elfin-wood warbler areas that have been affected by hurricanes.

Determine current density of the elfin-wood warbler within the El Yunque National Forest and the Maricao Commonwealth Forest.

Establish a long-term elfin-wood warbler population monitoring effort. An annual EWWA survey count should be established within El Yunque National Forest and the Maricao Commonwealth Forest to determine the status and trend of the species.

Search for the species in new areas within El Yunque National Forest using different technologies such as the playback technique.

Conduct scientific studies to understand the biology and ecology of the elfin-wood warbler (e.g., breeding success, clutch size, territorial behavior, seasonal movements, habitat selection, and mortality).

Determine what factors are limiting the distribution of the species.

Intensify outreach and education efforts for the elfin-woods warbler to increase awareness of the species and its conservation, particularly in municipalities located adjacent to its known habitats.

Determine if the population in El Yunque National Forest is still declining.

## **Priority Table**

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	Imminent	Monotype genus	7
		Species	8
		Subspecies/Population	9
	Non-imminent	Monotypic genus	10
		<b>Species</b>	<b>11</b>
		Subspecies/Population	12

### Rationale for Change in Listing Priority Number:

We changed the LPN to a 5 due to the continuing decline of one of the remaining two populations. The threats are high in magnitude and the threats are ongoing

### Magnitude:

We consider the magnitude of the threats identified above as moderate. The population from El Yunque National Forest, one of the two known populations has experienced a significant decline in recent years (Arendt et al., 2013, p.1). Loss of this population would limit the distribution of the species to Maricao Commonwealth Forest (on the western end of the island). However, the population in the Maricao Commonwealth Forest sustains a higher number of elfin woods warblers per hectare (or acre). The El Yunque National Forest, population represents 38% of the total population. The potential loss of the El Yunque National Forest population would limit possible gene flow between populations or result in complete loss of the genetic diversity of the eastern population, if there is no current gene flow between populations. Loss of genetic diversity could have harmful consequences for the survival and recovery of the species. Potential consequences may include limiting the species ability to adapt to stresses and challenges in a changing environment (e.g. could make the species susceptible to deceases). In addition, populations with low genetic diversity may experience loss of fitness through the expression of deleterious recessive alleles in homozygous individuals. (e.g. low fertility and high mortality among offspring). This information is based on data that needs further analysis, thus, we find the magnitude of existing threats to be moderate at this time.

### Imminence :

The immediacy of threats to elfin-woods warbler is nonimminent because most of the known range of this species is within forests administered and managed by the DNER or the U.S. Forest Service and both agencies have regulatory mechanisms to address maintenance activities at the telecommunication tower areas and current trails.

   Yes    Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

### Emergency Listing Review

No   Is Emergency Listing Warranted?

The emergency listing of the species is not currently needed. Although the population in the El Yunque National Forest has declined, the Maricao Commonwealth Forest population sustains higher number of elfin woods warblers per hectare or acre. While threats continue to exist for both populations, Delannoy (2007, p. 24) stated that the Maricao Commonwealth Forest population is currently thriving, and there is no indication that this population is declining in numbers. Additional survey studies are needed to monitor the current status of the species.

### **Description of Monitoring:**

The Service funded studies to investigate the status and nesting habitat requirements of the elfin-woods warbler at the Maricao Commonwealth Forest. Studies have been conducted in cooperation with the University of Puerto Rico, Mayaguez Campus.

**Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:**

Puerto Rico

**Indicate which State(s) did not provide any information or comment:**

none

### **State Coordination:**

The DNER manages the Maricao Commonwealth Forest and sporadically provides assistance and information on recent sightings and trail access. Additionally, the Service works closely with the DNER in the coordination of research on elfin-woods warbler in this forest. The elfin-woods warbler is protected by the DNER and was included in the Comprehensive State Wildlife Action Plan (DNER 2005a, p. 26). Recently, DNER engaged with the USFWS, NRCS, and EnviroSurvey, Inc. in the restoration of habitat in privately-owned properties adjacent to the Maricao Commonwealth Forest.

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**Approval/Concurrence:**

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:  07/15/2013  
Date

Concur:  10/28/2013  
Date

Did not concur: \_\_\_\_\_ Date

Director's Remarks: