

**Elfin Tree Fern or Helecho de Bosque Enano  
(*Cyathea dryopteroides*)**

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



**Photo by Omar Monsegur, U.S. Fish and Wildlife**

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

**March 2025**

**5-YEAR REVIEW**  
**Elfin Tree Fern or Helecho de Bosque Enano (*Cyathea dryopteroides*)**

**GENERAL INFORMATION**

**Current Classification:** Endangered

**Lead Field Office:** Caribbean Ecological Services Field Office, Mayagüez, Puerto Rico,  
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**Reviewers:**

**Lead Region:** Atlanta Regional Office, Carrie Straight

**Date of original listing:** July 16, 1987 (59 FR 22936; June 16, 1987)

**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 ([50 CFR 424.11](#)). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about elfin tree fern's biology, habitat, and threats to inform this status review.

A notice of the initiation of this 5-year status review was published by the Service in the Federal Register on May 11, 2023 (88 FR 30324), with a 60-day comment period. We received no public comments during that period. The primary sources of information used in this analysis were the 2013 and 2019 5-year status review of the species (Service 2013, 2019), a master thesis on the species, technical reports, and personal communication with the species experts and other relevant literature. All recommendations resulting from this review are the result of thoroughly reviewing the best available information related to the elfin tree fern.

**FR Notice citation announcing the species is under active review:**

May 11, 2023 (88 FR 30324).

**Species' Recovery Priority Number at start of review (48 FR 43098):** 5. The elfin tree fern is a species with high degree of threat and a low recovery potential.

**Review History:**

Previous 5-year status reviews, recommending no change in species status, were signed on September 1, 2013, and July 25, 2019 (Service 2013 and 2019, respectively).

## REVIEW ANALYSIS

### Listed Entity

#### **Taxonomy and nomenclature**

The Cyatheaceae family, comprising approximately 500 species, is found in tropical and temperate regions. Members of this family are distinguished by their pluricellular hairs and various types of scales (Camacho-López 2017). Classification within the family has varied, with scientist using morphological and genetic studies to propose different aggrupation or genus. Currently, there are three main genus-level classification: *Alsophila*, *Cyathea*, and *Sphaeropteris*.

Although the Service recognizes the species as *Cyathea dryopteroides*, other entities or organizations recognize it as *Alsophila dryopteroides* or *Alsophila amintae*. These different names are considered as homotypic synonyms (name that refers to the same type specimen as another name), and the species remains endemic to Puerto Rico (Plants of the World Online 2024). Although we accept these synonyms, we will address the species as *Cyathea dryopteroides*, as it was listed in the Act.

#### **Distinct Population Segment (DPS) (61 FR4722)**

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 of a DPS to only vertebrate species. Because the species under review is a not a vertebrate, the DPS policy does not apply.

### Recovery Criteria

#### **Recovery Plan**

*Ilex cookii* and *Cyathea dryopteroides* Recovery Plan, January 1991.

*Ilex cookii* and *Cyathea dryopteroides* Recovery Plan Amendment, September 2019.

Recovery plans are not regulatory documents and 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](#)).

The amended recovery plan (Service 2019) specifies delisting criteria for *Cyathea dryopteroides* as follows:

1. Threat reduction and management activities have been implemented to a degree that the species will remain viable into the foreseeable future (addresses Factors A, B, D and E).

2. The existing six (6) populations of elfin tree fern within protected areas (Commonwealth Forests) show a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).
3. Establish two (2) additional populations of each the elfin tree fern within protected areas that shows a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).

None of the recovery criteria have been fully met.

All known elfin tree fern populations are found within public land managed for conservation. Nevertheless, a site-specific management plan has not been developed to avoid or minimize detrimental effects of habitat loss and individual/population impacts related to telecommunication facilities, associated infrastructure, access roads, and maintenance activities within these areas.

Current information indicates that the elfin tree fern is likely more abundant than previously believed. Populations seem to be increasing in numbers and natural recruitment has been observed in some of the populations. Nonetheless, this may be the result of wider habitat surveys and not necessarily that the populations are expanding or increasing.

Propagation of the elfin tree fern has been successfully conducted, and baseline information on the species' habitat requirements and phenology has been gathered. Although propagation has been achieved, spore germination (viability) remains low, and initial re-introduction efforts of the species has failed. Additionally, collecting viable spores from wild population remains challenging due to lack of viable spores and the timing for collecting spores.

### **Biology and Habitat Summary**

The elfin tree fern is a small tree fern, endemic to the elfin forests of the central mountain range of Puerto Rico. When listed in 1987, the elfin tree fern was only documented from four sites: Monte Cerrote in the municipality of Peñuelas, Monte Guilarte in the Guilarte Commonwealth Forest, and Cerro Rosa and Monte Jayuya both in the Toro Negro Commonwealth Forest (Service 1987). When the species Recovery Plan was completed in 1991, a total of 95 individuals had been documented within three of the four historically known areas (Figure 1; Table 1): 60 in Monte Jayuya, 25 in Cerro Rosa, and 10 at Monte Guilarte.

Since the recovery plan was written some surveys have been periodically conducted to determine the status of the species. The results of these efforts are summarized in Table 1 and sources are provided there. Elfin tree fern survey information gathered for this review did not differentiate between juvenile and adult individuals. Therefore, here we present overall abundance data making no distinction between the two age classes.

Between 2014 and 2017 (prior to Hurricane María), surveyors documented 149 elfin tree fern individuals distributed among 6 populations (Table 1). During 2016-2017 site visits, Camacho-

López reported juveniles near the adult ferns at four locations indicating successful recruitment of new individuals (Camacho-López 2017).

## **Current Population Estimates**

### *Toro Negro Commonwealth Forest*

The Cerro Rosa population have not been visited since 2017. In 2021, staff from the Service and Fairchild Tropical Botanic Garden surveyed several sites within the elfin tree fern population at Cerro Punta, within Toro Negro Commonwealth Forest and found 15-17 individuals, a marked decrease from 47 plants documented in 2017, after to Hurricane María (Table 1; Possley and Riibe 2022, Sustache, pers. comm., 2024). One of the two surveyed sites did not seem to be impacted by Hurricane María and they found 8 individuals, similar to previously reported. However, the other site had changes in canopy cover from likely hurricane damage that resulted in an increased light penetration. At this impacted site, only 4 of approximately 30 individuals were documented (Possley and Riibe 2022). Impacts from the hurricane likely resulted in changes in the understory vegetation and microhabitat conditions, providing some evidence of potential adverse effects on the species by hurricane events (Possley and Riibe 2022). The team surveyed a third site with high fern diversity, closed canopy, and few weeds, finding three elfin tree fern individuals (Possley and Riibe 2022). However, Possley and Riibe (2022) indicated that their population count was likely lower than the true population size and that there are large areas of potential habitat to search for the species at Cerro Punta. At Monte Jayuya the team confirmed 40 individuals, the same number reported by Camacho-López in 2017, including a group of 5 additional individuals not previously reported (Possley and Riibe 2022).

In 2022, surveyors within the Toro Negro Commonwealth Forest, documented 188 individuals within and surrounding the forest (Sustache and Quiñones 2022). In 2022, staff from Fairchild Tropical Botanic Garden and the Puerto Rico Department of Natural Resources visited the area and mapped 20 individuals near the summit of Cerro Tres Días, and 5 individuals on the roadside of State Road PR-143 (Table 1; Possley and Riibe 2022, Sustache and Quiñones 2022).

In 2024, Sustache and Quiñones found individuals of elfin tree fern at new locations within the Toro Negro Commonwealth Forest; 167 individuals south of State Road PR-143, in the streams tributary of the Inabón River, and 229 individuals in a stream at the northeast of the entrance of Cerro Tres Días. The Puerto Rico Department of Natural Resources is currently working on a distribution map of the species at this location (Table 1; Sustache, pers. comm., 2024).

In 2024, surveyors assessed the Cerro Maravilla population and found only seven elfin tree fern individuals (Sustache, pers. comm., 2024). The same year, in two other elfin tree fern assessments conducted in Cerro Maravilla, Sustache and student, Alexis Chaparro, found a new population of 33-40 individuals (Sustache, pers. comm., 2024). This survey exemplifies that as new, appropriate habitat is surveyed additional individuals may be found.

### *Monte Guilarte, Tres Picachos Commonwealth Forest, and Monte Cerrote*

The population at Monte Guilarte could not be assessed in 2021, but was visited later in 2022, documenting 6 individuals (Possley and Riibe 2022), compared to the 15 individuals previously documented by Camacho-López (Table 1). However, Possley and Riibe (2022) noted that their

search was not exhaustive. Moreover, in 2024, a group led by Sustache assessed the population of Monte Guilarte and documented 17 individuals (Sustache, pers. comm., 2024).

The Tres Picachos and Monte Cerrote populations have not been visited since 2017, and therefore, the current status of those populations is unknown.

Table 1. Number of elfin tree fern known individuals (including juveniles and adults) per population. Note that in many cases, searches were not exhaustive.

Forest/Area	Location	1991 Individuals	2013 Individuals	2019 Individuals	Current (2021- 2022) Individuals
Toro Negro Commonwealth Forest	Monte Jayuya	60	71	40	45
Toro Negro Commonwealth Forest	Cerro Rosa	25	ND	7	ND
Toro Negro Commonwealth Forest	Cerro Punta	N/A	N/A	47	15-17
Toro Negro Commonwealth Forest	Cerro Tres Días	N/A	N/A	N/A	28
Toro Negro Commonwealth Forest	Roadside of State Road PR-143 (between Cerro Tres Días and Monte Jayuya)	N/A	N/A	N/A	8
Toro Negro Commonwealth Forest	Around Monte Jayuya (west and east of Monte Jayuya and on the headwaters of Río Saliente and Río Veguitas)	N/A	N/A	N/A	152
Toro Negro Commonwealth Forest	South of State Road PR-143 (near streams tributary of Río Inabón)	N/A	N/A	N/A	167
Toro Negro Commonwealth Forest	Stream northeast of the entrance to Cerro Tres Días	N/A	N/A	N/A	229
Toro Negro Commonwealth Forest	Cerro Maravilla	N/A	ND	28	40
Monte Guilarte	Monte Guilarte, Adjuntas	10	ND	15	17
Monte Cerrote	Monte Cerrote (Type locality)	ND	ND	0	ND
Tres Picachos Commonwealth Forest	Tres Picachos Commonwealth Forest	N/A	N/A	12	ND
	<b>Total</b>	<b>95</b>	<b>71</b>	<b>149</b>	<b>701-703</b>

N/A = Population or site was not known.

ND = No data (the area was not surveyed during this time period).

Data Sources = 1991 (Recovery Plan; Service 1991); 2013 5-year status review (Service 2013); 2019 5-year status review (Camacho-López 2017; Service 2019); Current (Possley and Riibe 2022, Sustache and Quiñones 2021-2022, 2024).

***Ex-situ efforts:***

Through the years numerous partners have attempted to collect elfin tree fern fronds and spores for *ex-situ* conservation (e.g., Fairchild Tropical Botanic Garden; Table 2). Establishing an *ex-situ* population (off site or away from natural location) by banking spores in long-term storage facilities helps safeguard the genetic diversity of wild populations and make that material available for reintroductions in case of natural population declines (Possley and Maschinski 2015). From these efforts, sporophytes (the “fern” as we know it, which is the stage that produces spores) have been sent for long-term storage at the USDA National Laboratory for Genetic Resources Preservation (NLGRP) in Fort Collins, Colorado (Possley et al. 2020). As discussed in the Recovery Plan section of this document, although propagation has been achieved, spore germination (viability) remains low, and initial re-introduction efforts of the species has failed. Additionally, collecting viable spores from wild population remains challenging due to lack of viable spores and the timing for collecting spores.

In 2023, the Service established a cooperative initiative with the Puerto Rico Department of Natural and Environmental Resources and the NGOs Envirosurvey, Inc., and Para La Naturaleza to protect suitable habitat for listed species, including the elfin tree fern, augment their natural populations, and to enhance the habitat connectivity between the Guilarte Commonwealth Forest and surrounding privately owned agricultural lands.

Table 2. *Ex-situ* collections of elfin tree fern per population. Monte Jayuya is the only population with a living ex situ backup.

<b>Location</b>	<b>Collection Year</b>	<b>Collection</b>	<b>Current status</b>
Mote Jayuya, Toro Negro Commonwealth Forest	2014	Fronds from 12 individuals	11 individuals at Fairchild Tropical Botanical Garden nursery
Cerro Rosa, Toro Negro Commonwealth Forest	ND	ND	ND
Cerro Punta, Toro Negro Commonwealth Forest	2017	6	Died
Cerro Tres Días, Toro Negro Commonwealth Forest	2022	3	No germination
Roadside of State Road PR-143 between Cerro Tres Días and Monte Jayuya, Toro Negro Commonwealth Forest	Attempted 2022	No collection due to herbivory	ND
Around Monte Jayuya (west and east of Monte Jayuya and on the headwaters of Río Saliente and Río Veguitas), Toro Negro Commonwealth Forest	ND	ND	ND
Monte Guilarte	2017	4	No germination
Monte Cerrote (Type locality)	ND	ND	ND
Cerro Maravilla, Toro Negro Commonwealth Forest	ND	ND	ND
Tres Picachos Commonwealth Forest	ND	ND	ND

ND= Area was not visited, or no collection was conducted

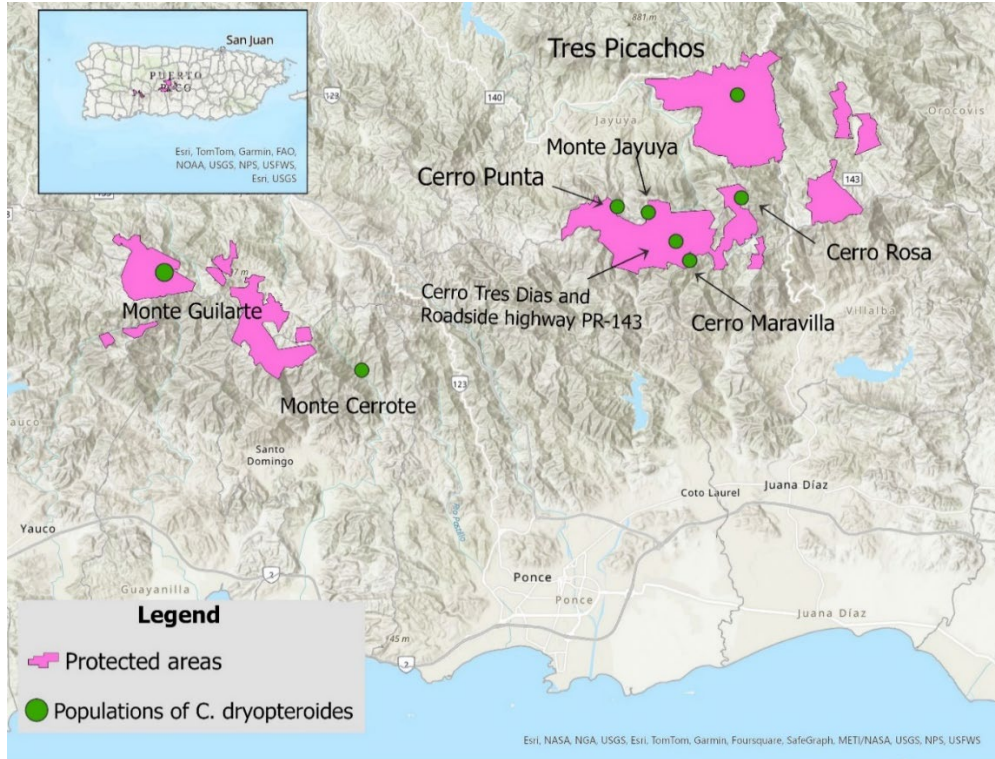


Figure 1. Populations of elfin tree fern (circles) and protected areas (highlighted in pink) in central Puerto Rico.

### **Threats (Five-Factor Analysis) Summary**

The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act. A summary of this assessment is detailed below.

Currently, threats to the elfin tree fern include habitat destruction and modification associated with trampling and deforestation related to telecommunications infrastructure installation, improvements, and repair resulting in direct impacts to individuals and related to habitat. In addition, habitat and individuals are impacted by feral hogs (Factor A). The inadequacy of existing regulatory mechanisms (Factor D) continues to threaten the species, mostly due to lack of protection outside the Act on privately own lands. Other natural or manmade factors continue to impact the elfin tree fern, including invasive species, hurricanes, landslides, and climate change (Factor E). See additional details about these threats below.

**Factor A. The present or threatened destruction, modification, or curtailment of its habitat or range.** As explained in the previous 5-year status review (Service 2019), the elfin tree fern is threatened by habitat destruction and modification mainly due to telecommunication infrastructure. Maintenance work and communication tower enhancements and/or improvements could result in direct impact to individuals and/or habitat destruction and modification, particularly after a natural disaster (e.g., debris removal, trimming and cutting vegetation, and

reconstruction work after Hurricane María). Additionally, maintenance work along the existing power lines that serve these communication facilities may be a threat to the fern and its habitat (Service 2013). As part of the maintenance of the towers, there is no mechanism for the disposal or recycling of materials such as: unused equipment, tower parts, cables, wooden boxes, glass bottles and other unused materials, and end up being dumped in the forest (Sustache, pers. comm., 2024). Moreover, most of the access road to the summit of Cerro Punta is unpaved, subject to continuous erosion and making the habitat vulnerable to landslides. Furthermore, the soil used to fix the road is always exposed and is constantly washed away by rain runoff resulting in impacts to the dwarf tree fern suitable habitat including ravines (Sustache, pers. comm., 2024). This work coupled with the lack of awareness of the species by crews conducting that work, could pose a threat to the elfin tree fern and its habitat.

Furthermore, habitat destruction and increases in erosion and degradation of the ecosystem caused by feral pigs has been seen in the tributary ravines of the Río Inabón, where one of the known largest populations of elfin tree fern is found (Sustache, pers. comm., 2024). Individuals of elfin tree fern have been observed uprooted and destroyed by the type of foraging these animals do to find food (Sustache, pers. comm., 2024). This new finding on pig impacts to the species and its habitat seems to pose a new threat to the elfin tree fern. Additional monitoring and data collection is needed to determine the effects this new threat on the species. Based on the above discussion, the Service believes the present or threatened destruction, modification, or curtailment of the species habitat or range is a current threat to the elfin tree fern.

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

As stated in the 2019 5-year status review, the Service is still not aware that overutilization of this species for commercial or recreational purposes through collection for ornamental trade has occurred or is currently occurring. The species continues to be protected under commonwealth regulations which prohibits collection of listed plant species (see Factor D). Therefore, the Service believes that the elfin tree fern is not threatened by this factor.

**Factor C. Disease or predation.**

Although disease and predation has not been considered a threat to the elfin tree fern, Fairchild Tropical Botanic Garden staff documented heavy insect herbivory on the population at Monte Jayuya and the recently discovered population on the roadside of Sate Road PR-143 in the Toro Negro Commonwealth Forest (Possley and Riibe 2022). Sustache also has observed insect herbivory on individuals on the recently found populations, but he has not considered it a threat to the species (Sustache, pers. comm., 2024). Given herbivory has been observed sporadically within the populations, we continue to consider that the species is not threatened by this factor, although sites or individuals may undergo high levels of herbivory. Additional monitoring is needed to determine if the species is being threatened by herbivory.

**Factor D. The inadequacy of existing regulatory mechanisms.**

At present, Puerto Rico's Law No. 241-1999 (12 L.P.R.A. Sec.107), known as the New Wildlife Law of Puerto Rico includes provisions to protect habitat for all wildlife species, including plants. In addition, the elfin tree fern is protected by the Puerto Rico Department of Natural and Environmental Resources Regulation 6766, which, under Article 2.06, prohibit collecting, cutting, and removing, among other activities, listed plant individuals within the jurisdiction of

Puerto Rico (DRNA 2004). As discussed in the 2019 5-year review, we continue to believe that these protections are not fully adequate to protect the elfin tree fern from threats of habitat modification on non-conservation lands (Service 2019). Since lack of awareness of the species or ability to identify the species by crews working on protected lands limits its protection in some areas and suitable habitat for the species has been found in privately owned lands that do not have the same protections as conservation lands (i.e., lands adjacent to the Guilarte Commonwealth Forest), the Service continues to believe that regulatory mechanisms outside of the Act are still insufficient to protect the species and their habitats.

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

Other natural or manmade factors continue to impact the elfin tree fern, including invasive species, hurricanes, landslides, and climate change as discussed in the 2019 5-year status review (Service 2019). These threats are exacerbated by the elfin tree fern's limited distribution, low reproductive capacity and highly specialized ecological requirements.

Disturbance and Changes to Plant Community.

Invasive native plants such as the fern *Gleichenella pectinata* may invade and alter diverse native dwarf forest communities, often resulting in plant monocultures that support few wildlife species (Service 2013). These species take advantage of disturbance from things like hurricanes, landslides, fire, and human land-clearing activities, to rapidly colonize forest gaps and out-competing species like elfin tree fern. During field surveys in 2016, Fairchild Tropical Botanic Garden found that invasive species from adjacent disturbed habitats (e.g., *Gleichenella pectinata*, *Hypolepis repens*) had invaded the elfin tree fern areas (Possley and Lange 2016). Also, Camacho-López (2017) identified several native species as threats to the elfin tree fern, including the forest climbing bamboo (*Arthrostylidium sarmentosum*). This bamboo can grow over open ground and has shown to limit the fern's growth and habitat availability. Some pioneer species as the fern *Gleichenella pectinata* that's has a vigorous growth in disturbed areas can threaten elfin tree fern by competing for resources and, in drought season may also serve as fuel for fires, which in turn modify the species' habitat, making it more susceptible to further plant species invasion (Service 2019). Currently, some areas at Monte Jayuya and Cerro Tres Días where elfin tree fern occurs is dominated by native pioneer species as *Arthrostylidium sarmentosum*, *Isachne angustifolia*, *Hypolepis repens* and the exotic *Rubus probus* (Possley and Riibe 2022, Sustache, pers. Comm. 2024). Also, in tributaries of Río Inabón, the exotic species *Croscomia x croscomiiflora* (hybrid) had invaded the habitat of the elfin tree fern and *Thelypteris inabonensis* (Sustache, pers. comm., 2024). We still have no information about the competitive abilities of elfin tree fern. Therefore, the effects of the pioneer and invasive species invasion within the elfin tree fern's habitat should be considered as a possible threat to the species.

Changes in Temperature, Precipitation, Hurricanes, and Associated Events.

The elfin tree fern also continues to be threatened by temperature and precipitation changes, hurricanes, and associated events. The 2019 5-year status review provides a thorough explanation of the threat the species faces due to these factors. In late 2017, Hurricane María impacted the island of Puerto Rico causing major damages to forested areas, especially at higher elevations (Van Beusekom et al. 2018). In 2021, Fairchild Tropical Botanic Garden staff documented severe damage to canopy coverage at a section of Cerro Punta, where the largest population of elfin tree fern was reported in 2017 (Camacho-López 2017, Service 2019). From

the 30 individuals previously mapped in one area, only 4 were found in 2021 (Possley and Riibe 2022). Additionally, damages and collapse of transmission towers and destruction of antennas/radios on towers due to hurricanes on areas where the species is present, could directly impact elfin tree fern individuals and their habitat.

Future climate models project an increase on impacts from hurricanes, including rainfall, storm surge, and strongest hurricanes (Category 3, 4, and 5) as well as increases in temperature and decreases in annual precipitation (Runkle *et al.* 2022; Intergovernmental Panel on Climate Change 2023). In high elevation areas, these changes also increase the risk of landslides that can result in large disturbances to areas around the island. These impacts coupled with the species' limited distribution and specific ecological needs, pose a great threat to the elfin tree fern throughout its range. Although new populations of the species have been found and potential suitable habitat that could harbor additional populations has been documented, these locations are still confined to areas of high elevations with specific environmental characteristics. Since the species is restricted a narrow range, any habitat alteration related to climate change, could hinder its ability to adapt and survive. For example, hurricane impacts could reduce canopy cover and promote changes in habitat conditions (Pérez et al. 2021) that the elfin tree fern relies on for shade and moisture regulation. Without the adequate canopy cover, these areas may experience increase sunlight exposure, reduced humidity, and higher temperatures, creating unsuitable conditions for the ferns to thrive. In 2022, J. Sustache documented that most individuals are found in wet habitats, often located in areas shielded from direct sunlight, with high humidity levels or within hollows (Sustache and Quiñones 2022). Also, steep slopes are typical of the elfin tree fern habitat (Possley and Riibe 2022) and the steep, high-elevation areas are more prone to erosion and landslides following hurricanes.

#### Additional Information

Elfin tree fern is not tolerant to fire impacts. However, the invasive species found in the area are fire-tolerant and make any site susceptible to human-induced catastrophic fires. Since fires are not natural to this habitat, the native flora is not adapted to such disturbance. As discussed above, disturbance from fire could accelerate the colonization of invasive plants such as *Gleichenella pectinata* and change the vegetation. In addition, these invasive plants form mats of dry material that serve as fuel for human induced fires (Service 2013).

The elfin tree fern is vulnerable to extinction due to low population numbers and restricted distribution coupled with alteration or loss of habitat. The limited distribution of the elfin tree fern may also exacerbate its vulnerability to natural or anthropogenic events such as hurricanes, landslides and genetic variation, compromising the continued existence of this species. Given the extremely limited geographic distribution and elevation range of the elfin tree fern, it is highly likely that its genetic variability is low. This would result in the loss of alleles by random genetic drift, which would limit the species' ability to respond to changes in the environment (Service 2013 and references therein).

#### Synthesis

The elfin tree fern is a small tree fern, endemic to the elfin forests of the central mountain range of Puerto Rico. The elfin tree fern is currently known to occur at 11 localities within the

Commonwealth Forests in Puerto Rico: 9 localities at the Toro Negro Commonwealth Forest, 1 at the Guilarte Commonwealth Forest, and 1 at the Tres Picachos Commonwealth Forest. However, there are some patches of appropriate habitat that have not been surveyed that could harbor the species. The most updated information indicates that there are more than 700 elfin tree fern individuals from 11 localities compared to 149 individuals in 6 localities documented in the 2019 5-year status review. This increase is likely the result of increased survey effort in new locations rather than new range expansions. The elfin tree fern is currently threatened by habitat destruction including modifications, enhancement and repairs to existing communication towers, road construction, and trail and road maintenance activities (Factor A). A new threat, foraging activities of feral pigs damaging habitat and uprooting individuals, has been documented and will need to be assessed to determine the level of this threat. Additionally, protections of the species on non-conservation and conservation lands seems to be insufficient to protect the species from threats (Factor D). Negative impacts to habitat and individuals from changes in temperature, precipitation, hurricanes, and landslides are likely to continue into the future (Factor E). Based on the information gathered during this review, we recommend that the elfin tree fern continues to meet the definition of endangered because of its limited distribution and highly specialized habitat requirement, which make it vulnerable to ongoing threats of habitat modification, hurricanes, and landslides.

## **RECOMMENDED FUTURE ACTIVITIES**

A detailed discussion of recovery actions and criteria are presented in the Recovery Plan (Service 1991). In the course of this status review new and/or targeted potential recovery activities were identified and are included below:

- Evaluate the abundance and distribution of the elfin tree fern yearly through surveys within traditional and non-traditional sites, using habitat models and best available plant survey methodology to determine current population numbers. Additional visits should be conducted after hurricanes, landslides, or other major disturbances to determine their effects on the populations and to determine needed management actions (e.g., habitat enhancement, invasive species removal, etc.).
- Identify the number of viable populations necessary to protect and stabilize the elfin tree fern population (wild, naturally-reproducing populations large enough to maintain sufficient genetic variation, and evolve and respond to natural habitat changes).
- Continue evaluating and implementing conservation measures to minimize possible adverse effects to the elfin tree fern from construction, improvement of communication facilities, and construction/expansion of roads and trails in Toro Negro and Guilarte Commonwealth forests.
- Studies should be conducted on the species' phenology and habitat requirements.
- Optimize propagation and reintroduction protocols for the elfin tree fern.
- Collaborate with botanical gardens (e.g., Atlanta Botanical Garden, Fairchild Botanical Garden) for species' spore banking for research and future reintroduction efforts.
- Continue to work with partners to protect the species' habitat within private lands through conservation agreements.

- Monitor feral pig activity within elfin tree fern habitat to determine their impacts on the elfin tree fern and its habitat, and determine potential management actions to protect the species from feral pigs.

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**RESULTS / SIGNATURES**

**U.S. Fish and Wildlife Service  
Status Review of Elfin Tree Fern (*Cyathea dryopteroides*)**

**Status Recommendation:**

On the basis of this review, we recommend the following status for this species ([50 CFR § 424.11](#)). 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.

- Downlist to Threatened.
- Uplist to Endangered.
- Delist:
  - The species is extinct.*
  - The species is recovered.*
  - New information indicates 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.*
- No change needed.

**Field Supervisor, Caribbean Ecological Services Field Office, U.S. Fish and Wildlife Service**

Approve \_\_\_\_\_