

**Cook's Holly**  
***(Ilex cookii)***

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



**Photo by Omar Monsegur (USFWS)**

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

**August 2025**

**5-YEAR STATUS REVIEW**  
**Cook's Holly (*Ilex Cookii*)**

**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 the Cook's holly (*Ilex cookii*) 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. The Service did not receive any 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, technical reports, 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 Cook's holly.

**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. Cook's holly 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 August 6, 2013, and June 21, 2019 (Service 2013 and 2019a, respectively).

## **REVIEW ANALYSIS**

### **Listed Entity**

#### **Taxonomy and nomenclature**

No new information regarding taxonomic classification or changes in nomenclature was found during this review.

#### **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 (Service 1991).

*Ilex cookii* and *Cyathea dryopteroides* Recovery Plan Amendment, September 2019. (Service 2019b)

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

The amended recovery plan (Service 2019b) specifies delisting criteria for both elfin tree fern (*Cyathea dryopteroides*) and Cook's holly are 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 and the two (2) populations of Cook's holly 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 and the Cook's holly within protected areas that shows a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).

The Service believes these criteria are appropriate and relevant, however, no criteria have currently been met for Cook's holly.

### **Biology and Habitat Summary**

Cook's holly is an evergreen shrub or small tree, endemic to the elfin forests of the central mountain range of Puerto Rico. When listed, Cook's holly was only documented from two sites near the summits of Cerro Punta and Monte Jayuya, both located within Toro Negro Commonwealth Forest (Service 1991). When the species' Recovery Plan was finalized in 1991, there were only 1 mature individual and 4 sprouts in the type locality of Cerro Punta, and 30 sprouts or seedlings along the ridge tops of Monte Jayuya (Service 1991).

From 1987 until 2020, the species was believed to potentially be extinct primarily caused by construction of telecommunication towers along the only known locations of the species (PRDNER 2022). In 2011, search efforts by the University of Puerto Rico, Mayagüez Campus, to locate the species at Cerro Punta resulted in no findings (Service 2019, PRDNER 2022). However, between 2020 and 2021, surveys conducted by the Puerto Rico Department of Natural and Environmental Resources identified 117 Cook's holly individuals (i.e., 92 adults and 25 shrubs) in the Toro Negro Commonwealth Forest and adjacent private lands (PRDNER 2022). The location of each individual was recorded and documented. Thirty-one of those individuals were seen at the species type locality, Cerro Punta and two nearby mountains, 72 individuals were located at Monte Jayuya and nearby westward hills, and 14 other individuals were observed on the mountains between the entrance to Cerro Punta and Monte Jayuya (Table 1; PRDNER 2022). Most of the individuals are within the Toro Negro Commonwealth Forest, but some extend outside the forest boundary (PRDNER 2022).

Another survey conducted by the Puerto Rico Department of Natural and Environmental Resources between 2021 and 2022, recorded 30 new Cook's holly individuals: 15 individuals in different areas within 4 known locations and 15 individuals within 4 new locations (Table 1). (see Table 1 and Figure 1). These new findings bring the total number of individuals to 147 extending the species from the known range in the Toro Negro Commonwealth Forest into Cerro Tres Días and the mountains northeast of Monte Jayuya (Table 1; Figure 1; PRDNER 2023).

New information has shed some light on Cook's holly reproduction, showing fertile individuals in reproductive stages, with buds, flowers and fruits, from September to April (PRDNER 2023). One individual was found with about around 73 ripe fruits during surveys completed in 2020 (PRDNER 2022). Nevertheless, no seedlings were observed during any of the surveys conducted during 2020-2022 (PRDNER 2022, 2023). Despite the absence of evidence regarding seed dispersal by animals and the lack of observed seedlings in the field (PRDNER 2022), solitary individuals were documented during field surveys conducted in 2022 (exact locations not shared) (PRDNER 2023). This finding raises the question if the lack of seedling documentation could be due to challenges in identifying the species during early growth stages (PRDNER 2022).

Furthermore, the Service has sponsored a study on the genetic variability of Cook's holly, which will help develop sound conservation and recovery actions related to the species population structure and adaptive capabilities.

Table 1. Number of Cook’s holly individuals (juveniles and adults) known to occur in the Toro Negro Commonwealth Forest. For locations we haven’t re-surveyed, no data, we assume similar numbers as the previous survey.

Forest / Area	Location	Num. of individuals 1991	Num. of individuals 2020-2021	Num. of individuals 2021-2022
Toro Negro Commonwealth Forest	Cerro Punta*	5	3	1
Toro Negro Commonwealth Forest	Cerro Punta, NE of second tower	N/A	1	ND (1)
Toro Negro Commonwealth Forest	Next peak NW of Cerro Punta	N/A	25	3
Toro Negro Commonwealth Forest	Cerro Punta, West Ridge	N/A	1	ND (1)
Toro Negro Commonwealth Forest	East of Cerro Punta	N/A	1	ND (1)
Toro Negro Commonwealth Forest	Monte Jayuya (A mile east of Cerro Punta)	30	17	ND (17)
Toro Negro Commonwealth Forest	Other side of the road of Monte Jayuya;	N/A	4	ND (4)
Toro Negro Commonwealth Forest	South, Monte Jayuya; other side of road on Km 18.8	N/A	40	ND (40)
Toro Negro Commonwealth Forest	East of Monte Jayuya Carr 143, Km 18.8;	N/A	3	2
Private property	Next peak Northwest of Monte Jayuya;	N/A	16	9
Toro Negro Commonwealth Forest	Mountain to the left of the road approximately 50 m after Monte Jayuya.	N/A	ND	6
Toro Negro Commonwealth Forest	Southeast Monte Jayuya; Km. 20.9	N/A	N/A	1
Toro Negro Commonwealth Forest	Between Monte Jayuya and Cerro Punta	N/A	6	ND (6)
Toro Negro Commonwealth Forest	Cerro Tres Días (DTOP)	N/A	N/A	5
Toro Negro Commonwealth Forest	Peak 0.5 mi NW of Cerro Maravilla	N/A	N/A	3
<b>Total of individuals</b>		<b>35</b>	<b>117</b>	<b>30 (70) =100</b>

N/A = Population or site was not known.

ND = No data (surveys not completed, we assumed numbers are similar to previous survey year).

Data Sources: 1991 (Recovery Plan; Service 1991); 2020-2021 (PRDNER 2022); 2021-2022 (PRDNER 2023)

\*Type locality

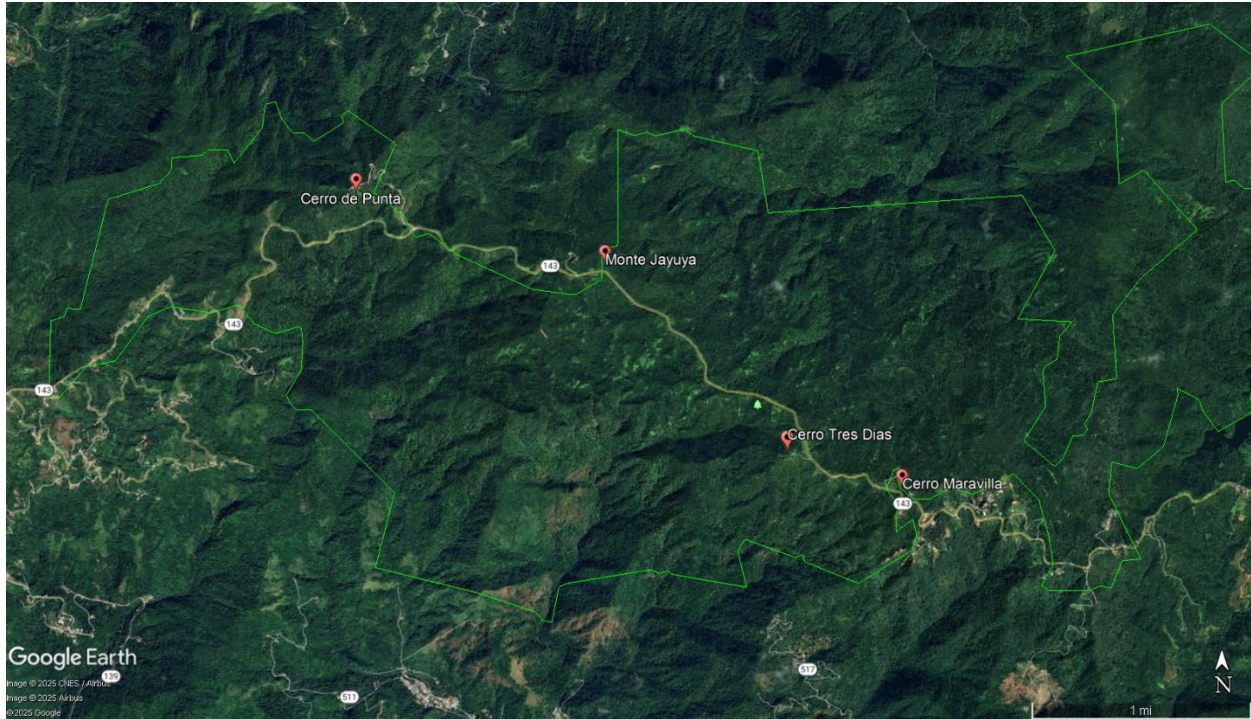


Figure 1. General localities where Cook’s holly individuals are distributed. Most within the Toro Negro Commonwealth Forest (green polygon) with some individuals extending into adjacent private lands.

**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 detailed review of the species’ threats can be found in the previous 5-year status reviews (Service 2013, 2019a) and in the recovery plan (Service 1991) of the species. A summary of current threats is detailed below.

At the time of listing, the major threats to Cook’s holly were habitat destruction and modification associated with trampling and deforestation for road constructions and the installation of communication tower facilities on the highest peaks of the Island (Factor A). Additionally, the inadequacy of existing regulatory mechanisms (Factor D) and other natural and manmade factors (Factor E) were also of concern for the species, this due to lack of protection from the commonwealth laws and species small population size (respectively). Currently the species continues to be threatened by the same Factors (A, D and E). Nevertheless, new available information provides more details and expand on threats associated to these factors.

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

As of the 2019 5-year status review, Cook’s holly was only believed to be distributed within The Toro Negro Commonwealth Forest (Service 2013, 2019a). However, new search efforts have expanded the species’ range not only within this Commonwealth Forest, but into adjacent private lands (PRDNER 2022, 2023). Outside protected areas, habitat modification and destruction has

resulted in the clearing of mature secondary forest for agriculture and construction of infrastructure (i.e., telecommunication) (PRDNER 2022), posing a threat to the species. Within the protected Commonwealth Forest, Cook's holly may be protected from anthropogenic habitat destruction but those individuals occurring near communication towers (i.e., Cerro Punta and Monte Jayuya) are threatened by habitat destruction and modification due to construction and maintenance of those telecommunication facilities (Service 2013, PRDNER 2022). These actions could result in direct impacts to Cook's holly individuals as well as to its habitat, particularly after natural disasters such as hurricanes (e.g., clearing for access and repair of the facilities, debris removal, trimming and cutting vegetation). Additionally, maintenance work along existing power lines servicing these communication facilities poses a risk to the species and its habitat (Service 2013). Moreover, there does not appear to exist a protocol for the proper disposal or recycling of materials such as unused equipment, tower components, cables, wooden boxes, etc., in these communication facilities. These materials are being discarded into the forest as observed by the botanist of the Puerto Rico Department of Natural and Environmental Resources, José Sustache (Sustache, pers. comm., 2024). In addition, the access road to the summit of Cerro Punta is unpaved and continually erodes, making the habitat more susceptible to landslides. The soil being used to repair roads to the facilities remain exposed, therefore, it is frequently washed away by rain runoff, adversely affecting suitable habitat for the Cook's holly (Sustache, pers. comm., 2024).

Based on the above discussion, the Service believes the present or threatened destruction, modification, or curtailment of the species habitat or range continues to be a threat to Cook's holly.

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

The Service is 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 Federal and Commonwealth laws and regulations that prohibit collection of listed plant species without appropriate permits (see Factor D). Therefore, the Service believes that Cook's holly is not threatened by this factor.

**Factor C. Disease or predation.**

Disease and predation have not been documented as a threat to the species. Based on the best available information, the Service continues to consider that the species is not threatened by this factor.

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

Existing regulatory mechanisms not including the Endangered Species Act are insufficient to protect the species from threats occurring on private lands, threats associated with construction and development, and threats related to emergency response related to natural disasters. Currently, this plant is protected under Commonwealth's Law No. 241-1999 (12 L.P.R.A. Sec. 107), known as *Nueva Ley de Vida Silvestre de Puerto Rico* (New Wildlife Law of Puerto Rico) and Regulation 6766 or *Reglamento para Regir el Manejo de las Especies Vulnerables y en Peligro de Extinción en el Estado Libre Asociado de Puerto Rico* (Regulation 6766: To govern the management of threatened and endangered species in the Commonwealth of Puerto Rico).

The provisions of Law No. 241-1999 and Regulation 6766 extend to private lands. However, the protection of listed species on private lands is challenging as landowners may damage those species (e.g., by cutting, pruning, or mowing) unaware they are a protected species. These measures provide some protections for the species on protected lands; however, they are inadequate to protect the species on private lands.

Based on the presence of commonwealth laws and regulations protecting Cook's holly, inadequacy of existing regulatory mechanisms will protect the species from purposeful collection. However, as previously stated, it is important to highlight that enforcement of these laws and regulations continues to be a challenge due to lack of knowledge of the species (Service 2013). This lack of knowledge and enforcement threaten the species and its habitats when engaging on maintenance tasks either to the roads and/or telecommunication facilities within the forest. Emergency work after natural disasters to restore telecommunications and other infrastructure may also be performed before work areas can be assessed for presence of Cook's holly. Moreover, expansion of the species into private properties exposes the species to additional threats, since current legal protections (as explained above) are not fully adequate to protect the species from threats of habitat modification on private non-conservation lands.

Due to the continue threat of lack of protections to the species in public and private land, the Service continues to believe that the species is still threatened by Factor D.

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

Other natural or manmade factors continue to impact Cook's holly, including invasive species, hurricanes, landslides, and climate change as discussed in the 2013 5-year status review (Service 2013). These threats are exacerbated by the species' limited distribution, and low reproductive capacity.

##### Limited distribution

Although new Cook's holly individuals have been discovered, extending the population to other areas within the Toro Negro Commonwealth Forest and into adjacent private properties, the species continues to have the same limited geographical distribution. With little information on species dispersal mechanisms and limited evidence of seedlings in recent surveys, its limited geographic range continues to be a threat to the species.

##### Low reproductive capacity/Highly specialized ecological requirements

Cook's holly apparent lack of recruitment poses a significant threat to the species, as no seedlings have been documented despite the presence of flowers and fruits (PRDNER 2022, 2023). This absence of seedlings not only impacts the Cooks holly's population size, but also limits the species' ability to rebound from natural disturbances and colonize new areas.

##### Genetic variation

Cook's holly is suspected to have a low genetic variation due to species small population size and restricted distribution (Service 2013). Currently, there is an ongoing study by the University of Puerto Rico to determine the species' genetic variation and reproductive biology. This information will enhance our understanding on the species' viability, adaptability and needs to help the Service and species experts establish sound recovery actions. Additionally, the apparent

lack of seed dispersers, may pose a threat to the species since it hinders its genetic diversity, hence its representation.

Field observations by the Puerto Rico Department of Natural and Environmental Resources indicate that Cook's holly can grow like a tree when occurring in a forest area, or like a shrub when growing on disturbed areas where the vegetation is very dense (PRDNER 2022). This finding suggests the species exhibits some phenotypic plasticity or ability to express different phenotypes in response to the surrounding environmental conditions within generations. That is, a single genotype can produce different phenotypes, based on environmental characteristics.

While phenotypic plasticity can enhance survival under specific conditions, understanding the population genetics of the species is crucial to inform effective conservation and recovery actions. Genetic diversity within a population can influence its resilience to environmental changes, disease, and other threats. Thus, the knowledge of both phenotypic plasticity and population genetics is essential for developing sound conservation and recovery actions for Cook's holly.

#### Hurricanes and landslides

As discussed in the 2013 5-year status review (Service 2013), the Cook's holly geographical distribution at high elevation areas exposes the species to strong winds from hurricanes and associated heavy rains (Service 2013). In late 2017, Hurricane María impacted the island of Puerto Rico causing major damages to forested areas, particularly at higher elevations (Van Beusekom et al. 2018). Nonetheless, an assessment by the Puerto Rico Department of Natural and Environmental Resources found that most Cook's holly individuals discovered in 2020, did not show signs of significant damage from this hurricane (PRDNER 2022). Puerto Rico Department of Natural and Environmental Resources biologists believe that the herbaceous shrubby habitat where most Cook's holly individuals are found acts as a natural barrier, protecting them from at least some hurricane winds (PRDNER 2022).

However, the possible damages by collapse of transmission towers and subsequent repair of damages caused by hurricanes and tropical storms could directly impact Cook's holly individuals and their habitat. During the Cook's holly assessment, José Sustache observed two old and large landslides that may have affected Cook's holly individuals in two areas: Cerro Punta and Cerro Tres Días. At Cerro Punta, some individuals were observed live within the landslide, and at Cerro Tres Días, the only individuals observed were found on the edge of a landslide approximately 30 meters deep. There were likely other individuals scoured or buried by these landslides. Sustache also mentioned that this landslide was likely a result of the construction of the road leading to the mountain peak. If the landslide continues, all individuals in this location could likely be lost (Sustache, pers. comm., 2025).

Future models project an increase in impacts to Puerto Rico and Cook's holly habitat from including rainfall (extreme precipitation events) and strongest hurricanes (Category 3, 4, and 5) as well as increases in temperature and decreases in overall annual precipitation (Runkle et al. 2022). Since the species is restricted a narrow range, any habitat alteration related to these changes, could hinder its ability to adapt and survive.

Based on the above information and the species' restricted distribution and low population size and predictions of an increase frequency and strength of tropical storms/hurricanes, and severe droughts (Hopkinson et al. 2008.), the Service conclude that Cook's holly is still threatened by other natural or manmade factors, affecting its continued existence.

### **Synthesis**

Cook's holly is an evergreen shrub or small tree endemic to the elfin forests of the Puerto Rico's central mountain range. When listed, only 1 adult individual and 30 seedlings were known from the mountains of Cerro Punta and Monte Jayuya in the Toro Negro Commonwealth Forest. Up until 2020, the species had not been seen and was thought to be extinct. Despite fears of extinction due to habitat loss from telecommunication towers, surveys from 2020 to 2022 by the Puerto Rico Department of Natural and Environmental Resources identified 147 Cook's holly individuals, extending the Cook's holly range into areas within and adjacent to the protected Toro Negro Commonwealth Forest. Major threats continue to be habitat destruction from road construction and telecommunication facilities (Factor A). Emergency measures needed to restore infrastructure after natural disasters and the inadequacy of regulatory mechanisms on private lands poses additional challenges because the plants are not protected on private lands and even on protected lands managers may be unaware of the species presence (Factor D). In addition, natural and manmade factors like hurricanes, and changes in environmental conditions (i.e., stronger hurricanes and shifts in temperature and precipitation) continue to threaten the species (Factor E). Cook's holly's limited geographical distribution, small population sizes, and low reproductive capacity hinder its survival and adaptation to environmental changes, along with its recolonization after stochastic events like hurricanes and landslides. While the species displays phenotypic plasticity, allowing it to thrive under varying conditions, the species' genetic variation, viability and reproductive biology is unknown. Based on the species' limitations and threats described in this review, the Service believes that Cook's holly continues to meet the definition of endangered.

### **RECOMMENDATIONS FOR FUTURE ACTIVITIES**

Recommendations continue to be the same suggested in the 2013 5-year status review (Service 2013).

- Conduct Cook's holly's surveys within historical locations and in non-traditional sites with suitable habitat for the species.
- Conduct studies on Cook's holly's phenology and reproductive biology to understand its viability and engage on sound recovery and conservation actions.
- Conduct propagation and reintroduction of the species to enhance the existing population.
- The species should be monitored on a regular basis to assess population status, and additional assessments should be conducted after hurricanes, landslides, or other major disturbances
- Outreach with private landowners to inform them about the presence of the plant and discuss options to protect the species' known locations.

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**RESULTS / SIGNATURES**

**U.S. Fish and Wildlife Service  
Status Review of Cook's Holly**

**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 OFFICE APPROVAL:**

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

Approve \_\_\_\_\_