

*Elaphoglossum serpens*  
(no common name)  
*Polystichum calderonense*  
(no common name)  
*Tectaria estremerana*  
(no common name)

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



**Tectaria estremerana**  
Photo by USFWS

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

## 5-YEAR REVIEW

*Elaphoglossum serpens* (no common name)  
*Polystichum calderonense* (no common name)  
*Tectaria estremerana* (no common name)

### I. GENERAL INFORMATION

**A. Methodology used to complete the review:** On September 27, 2006, the Service published a notice in the *Federal Register* (71 FR 56545) announcing the initiation of the 5-year reviews of *Elaphoglossum serpens*, *Polystichum calderonense*, *Tectaria estremerana* (ferns) and requesting new information concerning the biology and status of the species. A 60-day comment period was also opened. No comments were received from the public during this period.

This review was prepared by the lead recovery biologist for the species to summarize new information that the Service has on these species. We conducted a literature search on the species; no new information was found. We also requested information and comment from botanical experts familiar with these species (see List of Peer Reviewers). No comments from the peer reviewers were received.

#### B. Reviewers

**Lead Region:** Kelly Bibb, Southeast Region, (404) 679-7132.

**Lead Field Office:** Marelisa Rivera, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico, (787) 851-7297, extension 231.

#### C. Background

- 1. FR Notice citation announcing initiation of these reviews:**  
September 27, 2006; 71 FR 56545
- 2. Species Status:** 2009 Recovery Data Call  
Uncertain. No recent surveys have been conducted for these species and the current population numbers are not known. Their rarity and limited distribution makes these species vulnerable to habitat modification. Surveys to update the status of the species and determine the overall status of these species are needed.
- 3. Recovery Achieved:** 1 (1= 0-25% recovery objectives achieved)
- 4. Listing History**  
Original Listing for all 3 Ferns  
FR notice: 58 FR 32308  
Date listed: June 9, 1993

Entity listed: Species  
Classification: Endangered

**5. Review History:**

The Final Rule (58 FR 32308) determining *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* to be endangered pursuant to the Endangered Species Act (Act) of 1973, as amended, was published on June 9, 1993.

The Recovery Plan, a multi-species plan, included seven endemic fern species (*Adiantum vivessii*, *Elaphoglossum serpens*, *Polystichum calderonense*, *Tectaria estremerana*, *Thelypteris inabonensis*, *Thelypteris verecunda*, and *Thelypteris yaucoensis*) was approved and signed on January 17, 1995 (Service 1994).

The Recovery Data Call for *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* states that the status of these three species is uncertain. Last population surveys were conducted in 1991 for *Elaphoglossum serpens* and *Polystichum calderonense*, and in 1995 for *Tectaria estremerana*. No recent surveys have been conducted for these species to verify their abundance and distribution.

Recovery Data Call: 2009, 2008, 2007, 2006, 2005, 2004, 2003, 2002, 2001, 2000, 1999, and 1998

**6. Species' Recovery Priority Number at start of review (48 FR 43098):**

At the time of listing, *Elaphoglossum serpens* and *Polystichum calderonense* were considered as species with high degree of threat and a low recovery potential (RPN=5). *E. serpens* was known from only one locality where 22 individual plants occurred on the mossy trunks of only six trees (Proctor 1991, p.83). On the other hand, fifty-seven individuals of *P. calderonense* were found in two localities: La Silla de Calderón in Monte Guilarte, Adjuntas (45 individuals including juveniles), and Cerrote in Peñuelas (12 plants). According to Proctor (1991, p.153), both sites are vulnerable to indiscriminate cutting and fires.

*Tectaria estremerana* was recognized as a species with moderate degree of threat and high recovery potential (RPN=8). This species was reported from only one locality in the limestone hills of Puerto Rico: the vicinity of the Arecibo Radio Telescope (Proctor 1989, p.171). Later observations indicated that the species did occur in the Río Abajo Commonwealth Forest and in the Municipality of Florida.

7. **Recovery Plan:**

Name of plan: Puerto Rican Endangered Ferns Recovery Plan

Date issued: January 17, 1995.

II. **REVIEW ANALYSIS**

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

These ferns are plants and, therefore, not covered by the DPS policy. The other DPS questions will not be addressed further in this review.

B. **Recovery Criteria**

1. **Does the species have a final, approved recovery plan containing objective, measurable criteria?** The multi-species recovery plan which includes *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremarana* established reclassification from endangered to threatened (downlisting) as the recovery objective. The plan established four downlisting criteria for all seven species. The Plan did not establish recovery criteria for delisting.

2. **Adequacy of recovery criteria.**

a. **Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?** Yes.

We have not received additional information about the habitat and biology of these three species since the Plan was approved.

b. **Are all the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats?** No (see the Five Factor analysis below). We need to understand more about the abundance and distribution of these species to modify the original Plan's criteria.

3. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information.**

The plan established the following downlisting criteria for seven fern species including *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremarana*:

1. The known populations are placed under protective status.
2. An agreement within the Service and the Puerto Rico Department of Natural and Environmental Resources (DNER) concerning the

protection of the three of the seven species in Commonwealth forests has been developed and implemented.

3. An agreement within the Service and Cornell University concerning the protection of *Tectaria estremerana* on the Arecibo Radio Telescope has been prepared and implemented.
4. New populations (the number of which should be determined following the appropriate studies) capable of self perpetuation have been established within protected areas.

Criterion 1 has not been initiated. *Polystichum calderonense* and *Tectaria estremerana* are known to occur in privately-owned lands, and efforts to protect the areas have not been initiated.

Criterion 2 has been met. The Service and DNER have a signed Cooperative Agreement under Section 6 of the ESA to establish vigorous endangered species programs in Puerto Rico. The species are listed by DNER. Commonwealth laws and regulations appropriately protect the species and their habitats within public forests.

Criterion 3 and Criterion 4 have not been initiated.

## C. Updated Information and Current Species Status

### 1. Biology and Habitat

The Recovery Plan reported one locality for *Elaphoglossum serpens* with approximately 22 individual plants in Cerro Punta in Jayuya. The species was described as an epiphytic fern found in a patch of a montane dwarf forest, on the mossy trunks of only six trees (Proctor 1991, p.83). *Tectaria estremerana*, described as a terrestrial woody fern found in the karst region of northern Puerto Rico, was known from only one site in Arecibo in which 23 individuals were found (Proctor 1989, p.171). Observations and collections reported in 1992 and 1995 indicate that *T. estremerana* occur in two additional locations (Florida and Utuado). Fifty-seven individual plants of *Polystichum calderonense* are reported in two areas (Peñuelas and Guilarte Coomonwealth Forests). This species was described as an evergreen terrestrial fern found in two localities in the volcanic-origin mountains in the central and south central Puerto Rico (USFWS 1994, pp7-8).

- a. **Is there relevant new information regarding the species' abundance, population trends, demographic features, or demographic trends?** No.

- b. **Is there relevant new information regarding the species' genetics, genetic variation, or trends in genetic variation?** No
- c. **Is there relevant new information regarding taxonomic classification or changes in nomenclature?** No
- d. **Is there relevant new information regarding the species' spatial distribution, trends in spatial distribution, or historic range?** No
- e. **Is there relevant new information addressing habitat or ecosystem conditions?** No.

## 2. Five Factor Analysis

### (a) **Present or threatened destruction, modification, or curtailment of its habitat or range:**

In the final rule, destruction and modification of habitat was established as a significant factor that may affect the number and distribution of four endemic ferns including *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremezana* (US Fish and Wildlife Service 1993, p.32309). According to the rule, *E. serpens* was extirpated from the site in Monte Jayuya where it was first reported due to the construction of a communication facility. It was later reported by Proctor (1991, p.81) that most plants found on the summit of Cerro Punta were destroyed by the construction of telecommunication towers and only 22 survived the encroachment caused by this activity. Although the area where *Elaphoglossum serpens* historical population occurs is located within a Commonwealth forest, permit requests to build new communication facilities or expand currently existing ones are prevalent. The Puerto Rico Department of Natural and Environmental Resources is recommending monopole, multiple-use towers, as a habitat conservation measure, whenever possible instead of constructing new towers and antennae (Gerardo Hernández, PRDNER, pers. comm., 2007)

The Recovery Plan identifies destruction and modification of habitat as the most significant factors affecting the numbers and distribution of these three endemic ferns. *Polystichum calderonense* and *Elaphoglossum serpens* are also threatened by unplanned forest management practices conducted in Commonwealth forests.

*Polystichum calderonense* occurs on both privately- and publicly-owned lands. This species is present in the Guilarte Commonwealth

Forest and it was stated in the final rule that *P. calderonense* may be affected by forested management practices. This species was identified by Proctor (1991, p.153) as vulnerable to cutting or fires. In Peñuelas, according to the Recovery Plan, this species occurs in private lands which may be affected by industrial or residential development.

*Tectaria estremerana* was only known from one site within the property of the Arecibo Radio Telescope managed by Cornell University. The plan establishes that the population is located about 200 meters south of the telescope which makes the species vulnerable to any expansion or development of the facilities. Funds are limited for these facilities and their operation. In case these facilities are abandoned, new land uses that could possibly affect *T. estremerana* may be proposed in the future.

Based on the above, destruction, modification, and curtailment of *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* habitat or range continues to be a threat to these species. Due to the restricted distributions and relatively low population numbers of these three species, the immediacy of this threat is considered high.

**(b) Overutilization for commercial, recreational, scientific or educational purposes:**

These species are protected by local laws and regulations (see Factor d below) which prohibit collection of listed plant species. Therefore, overutilization for commercial, recreational, scientific, or educational purposes is no longer considered a threat for these three species.

**(c) Disease or predation:**

At the present time, the Service is not aware that disease or predation constitutes a limiting factor for these three fern species.

**(d) Inadequacy of existing regulatory mechanisms:**

In 1999, the Commonwealth of Puerto Rico approved Law #241 known as the “Nueva Ley de Vida Silvestre de Puerto Rico” (New Wildlife Law of Puerto Rico). The purpose of this law is to protect, conserve, and enhance both native and migratory wildlife species within its jurisdiction, regulate permits, regulate hunting activities, and regulate exotic species, among others. In 2004, the Puerto Rico Department of Natural and Environmental Resources approved the “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 regulate the management of threatened and endangered species in Puerto Rico). *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* are included in the list of protected species and designated as “critically endangered” under regulation 6766. This classification is given to a species which “faces an extremely high risk of extinction in the immediate future.” Under this regulation (Article 2.06) prohibits collecting, cutting, removing, among other activities, listed animals and plants within the jurisdiction of Puerto Rico.

Besides the above regulations, the Department as well as the Service considers these fern species when reviewing development projects and conducting section 7 consultation within the known range of the species or within their potential habitat.

Based on the presence of Federal and Commonwealth laws and regulations protecting *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana*, and the absence of evidence supporting lack of enforcement of regulations to protect this species or governmental measures to prevent destruction of its habitat, we believe that inadequacy of existing regulatory mechanisms should no longer be considered a threat to these three species.

**(e) Other natural or manmade factors affecting its continued existence:**

Limited distributions of *Elaphoglossum serpens*, *Polystichum calderonense* and *Tectaria estremerana* is an important factor affecting these species. In addition, small population numbers make them particularly vulnerable to extinction due to the lack of genetic variation necessary to evolve and respond to natural changes. The best available information collected for *E. serpens* showed only 22 individuals all occurring on the mossy trunks of 6 trees of *Lyonia rubiginosa* var. *stahlii* (present in one of its few known localities) in Cerro Punta, Jayuya. Twenty-three individuals of *T. estremerana* were found at its only known location in the limestone hills of northern Puerto Rico (Arecibo) and *Polystichum calderonense* was known from only two localities: Monte Guilarte Commonwealth forest in Adjuntas, and Cerrote in Peñuelas. Proctor (1991) reported that *P. calderonense* could also be affected by fires, and Hurricane Hugo in 1989 badly damaged the only known population of *Elaphoglossum serpens* in Cerro Punta.

Despite the occurrence of several major storms, due to the lack of information or evidence indicating major storms or fires will decimate

the existing populations of these three fern species, we believe that the magnitude of threat from other natural and manmade factors to *Elaphoglossum serpens*, *Polystichum calderonense* and *Tectaria estremerana* is low and the immediacy of threat is non-imminent.

### 3. Synthesis

*Elaphoglossum serpens* is an epiphytic fern presently known from the Cerro Punta in the municipality of Jayuya. Only 22 plants, all occurring on the mossy trunks of only six trees of *Lyonia rubiginosa* var. *stahlia* which has few known localities (Proctor 1991), are known. This species is found in the summit area in a patch of montane dwarf forest at an elevation of about 1,300 meters within the Toro Negro Commonwealth Forest.

*Polystichum calderonense* is an evergreen terrestrial fern only known from two localities. Forty-five individual plants (including juveniles) are known from the summit of “La Silla de Calderón” in the Monte Guilarte Commonwealth Forest (Proctor 1989). Additionally, 12 individuals found by Proctor (1991) in Cerrote Peñuelas in the municipality of Peñuelas.

*Tectaria estremerana* is a woody terrestrial fern which was found at Esperanza ward in Arecibo, in the vicinity of the Arecibo Radio Telescope (Proctor 1991). This species was only known from this site where approximately 23 individual plants were found. This species was later collected in the Río Abajo Commonwealth Forest in Arecibo and in a sinkhole near an old quarry at Florida Adentro Ward in the municipality of Florida.

According to the five factor analysis performed for this review, these three species are still threatened by Factor A (destruction, modification, and curtailment of habitat or range) and Factor E (other natural or manmade factors affecting its continued existence). Construction of new communication facilities or expansion of the existing ones may affect the only known population of *Elaphoglossum serpens* in Cerro Punta, Jayuya. *Polystichum calderonense* occurs on both privately- and publicly-owned lands and may be affected by forest management practices while occurring in publicly-owned lands and by industrial and/or residential development when present in private lands. At the same time, the only population known of *Tectaria estremerana* is located about only 200 meters south of the telescope which makes the species vulnerable to any expansion or development of the facilities.

Low numbers of individuals of each species are known from few localities. Since no new information is available to the Service showing that either the distribution or abundance of these species has improved, the limited distribution of *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* continues to be an important factor affecting these species. Therefore, we believe these three ferns continue to meet the definition of endangered under the Endangered Species Act.

### III. RESULTS

#### A. Recommended Classification:

  X   No change is needed

### IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- a. Evaluate abundance and distribution of *Elaphoglossum serpens*, *Polystichum calderonense*, and *Tectaria estremerana* through surveys within traditional and non-traditional sites, using the best available plant survey methodology to determine current population numbers, and number of viable populations necessary to protect and stabilize these three fern populations (wild, naturally-reproducing populations large enough to maintain sufficient genetic variation, and evolve and respond to natural habitat changes).
- b. Appropriate government agencies should continue evaluating and implementing conservation measures to minimize possible adverse effects of construction/improvement of communication facilities and forest management practices in Commonwealth forests.
- c. Review and modify the Puerto Rican Endangered Ferns Recovery Plan which includes these three species to establish delisting criteria. Recovery tasks should be reviewed and implemented.
- d. Propagation techniques should be developed for the species to establish new self-sustainable populations in protected areas.

## V. REFERENCES

- Proctor, George R. 1989. Ferns of Puerto Rico and the Virgin Islands. The New York Botanical Gardens Press, Bronx, New York. 389 pp.
- Proctor, George R. 1991. Puerto Rican Plant Species of Special Concern: Status and Recommendations. Publicación Científica Miscelánea No.2. Departamento de Recursos Naturales. San Juan, Puerto Rico 196 pp.
- U.S. Fish and Wildlife Service. 1994. Puerto Rican Endangered Ferns Recovery Plan. Atlanta, Georgia. 23pp.

## List of Peer Reviewers

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**U.S. FISH AND WILDLIFE SERVICE**  
5-YEAR REVIEW of *Elaphoglossum serpens* (no common name)  
*Polystichum calderonense* (no common name)  
*Tectaria estremerana* (no common name)

**Current Classification for the 3 Ferns:** Endangered

**Recommendation resulting from the 5-Year Review**

  X   No change is needed

**Review Conducted By**   Ana Roman and Marelisa Rivera  

**FIELD OFFICE APPROVAL:**

**Lead Field Supervisor, U.S. Fish and Wildlife Service**

Approve   Edwin Ruiz   Date   14 January 2010  

**REGIONAL OFFICE APPROVAL:**

*Acting*

**Lead Regional Director, Fish and Wildlife Service**

Approve   Amon L. Valente   Date   1-15-2010  

*The Regional Director must sign all 5-year reviews, unless the authority has been delegated by the Regional Director to the Field Supervisor.*