

**Erubia**  
**(*Solanum drymophilum*)**

**Status Review:**  
**Summary and Evaluation**



Photo by: Jose A. Sustache, Puerto Rico Department of Natural and Environmental Resources

**U.S. Fish and Wildlife Service**  
**South Atlantic-Gulf Region**  
**Caribbean Ecological Services Field Office**  
**Boquerón, Puerto Rico**

**June 2022**

## STATUS REVIEW

### *Erubia (Solanum drymophilum)*

#### GENERAL INFORMATION

**Current Classification:** Endangered

**Lead Field Office:** Caribbean Ecological Services Field Office (CESFO), Boquerón, Puerto Rico, Maritza Vargas, [maritza\\_vargas@fws.gov](mailto:maritza_vargas@fws.gov), and Carlos Pacheco, [carlos\\_pacheco.fws.gov](mailto:carlos_pacheco.fws.gov)

#### **Reviewers:**

**Lead Regional Office:** Carrie Straight, South Atlantic-Gulf and Mississippi Basin Region, Atlanta, GA (404) 679-7226.

**Date of original listing:** August 26, 1988 (53 FR 32827)

**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. The U.S. Fish and Wildlife Service (Service) evaluated the biology, habitat, and threats of erubia to inform this status review. In conducting this 5-year review, we relied on the best available information pertaining to historical and contemporary distributions, life histories, genetics, habitats, and threats of this species. We announced initiation of this review and requested information in a published Federal Register notice with a 60-day comment period on June 23, 2021 (86 FR 32965). We received no public comments during the open comment period. To complete this 5-year status review we used the information gathered by the Service since the 2015 erubia 5-year status review.

**FR Notice citation announcing the species is under active review:**  
June 23, 2021 (86 FR 32965)

**Species' Recovery Priority Number at start of 5-year review ([48 FR 43098](#)):** 8. The 2015 5-year review assigned a recovery priority number of 8, which indicate the species faces a moderate degree of threat and has a high recovery potential.

**Review History:** A previous 5-year review was signed on October 30, 2015 (Service 2015).

#### REVIEW ANALYSIS

##### Listed Entity

##### **Taxonomy and nomenclature:**

As discussed in the previous 5-year status review, erubia has used both *Solanum drymophilum* and *Solanum ensifolium* as its scientific name. Details about the use of both names are detailed in

the past review and in the literature (Knapp 2008; Strickland-Constable et al. 2010; Axelrod 2011; Acevedo-Rodríguez and Strong 2012; Service 2015; Hernández-Rosario et al 2019). Although the correct scientific name is still under review, the species (i.e., erubia) whether referred to as *S. drymophilum* or *S. ensifolium*, is considered a valid species and will be addressed in this review.

In addition to the confusion described above, erubia has been misidentified as *Solanum bahamense* in the past due to their morphological similarities; but analyses show (i.e., both parsimony analysis and haplotype data) that these species are clearly distinct. *Solanum bahamenses* is a species with more widespread distribution throughout the Caribbean region than *Solanum drymophilum*, so it has caused confusion in the past with erubia (Strickland-Constable et al. 2010). Nevertheless, it is important to highlight that available information on both *Solanum ensifolium* and *Solanum drymophilum*, support continued recognition of erubia as a distinct species of conservation concern in Puerto Rico. The Service will continue monitoring the taxonomic analysis of this species and address any new information. For now, we will continue using *Solanum drymophilum* as the official scientific name of erubia.

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

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 is not applicable.

#### **Recovery Criteria**

##### **Recovery Plan**

*Solanum drymophilum* Recovery Plan, July 9, 1992 (Service 1992).

Amended Recovery Plan for *Solanum drymophilum*, September 2019 (Service 2019).

The Amended Recovery Plan establishes that erubia could be considered for delisting when the following four criteria are met:

1. The two (2) existing populations on privately-owned lands (i.e., Salinas and Florida) are protected through conservation mechanisms (addresses Factors A and E).
2. Existing three (3) populations on Las Piedras del Collado, Río Abajo Commonwealth Forest, and the municipality of Florida show a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).
3. Establish three (3) new populations on lands protected by conservation mechanisms within the known geographical range of the species that demonstrate a stable or increasing trend, evidenced by natural recruitment and multiple age classes (addresses Factors A and E).
4. Threat reduction and management activities have been implemented to a degree that the species is viable into the foreseeable future (addresses Factor E).

None of the above delisting criteria have been met.

## **Biology and Habitat Summary**

A detailed review of the species' biology, distribution, abundance, and its habitat can be found in the previous 5-year status review for erubia (Service 2015).

Historically, erubia has been known from approximately 100-150 individuals in Las Piedras del Collado (Service 1992). An additional 50 individuals transplanted from the right of way of the highway PR 10 into the Río Abajo Commonwealth Forest (Puerto Rico Highway and Transportation Authority (PRHTA) 1995), Three individuals were documented at the municipality of Florida (Puerto Rico Department of Natural and Environmental Resources (PRDNER) 2013). By 2015, the most current overall abundance of the species was unknown, only three individuals found in the municipality of Florida (PRDNER 2013; Service 2015).

Currently we believe erubia may still occur in three (3) populations.

- 1) Las Piedras del Collado (previously known as Las Tetas de Cayey) in the municipality of Salinas
- 2) Río Abajo Commonwealth Forest in the municipality of Arecibo
- 3) Near State Road PR-140 in the municipality of Florida

However, in 2019 a search for the species was conducted at two of the populations, Río Abajo Commonwealth Forest and Florida, but no individuals were found (Hernández-Rosario et al 2019). This may indicate that the population status is in jeopardy of extirpation at both locations. Despite the limited updated information on the status of this species, we believe erubia still has a limited distribution, three or less isolated populations, and very limited number of individuals.

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

A detailed review of the species' threats can be found in the 2015 erubia 5-year status review (Service 2015). The status of a species is determined from an assessment of factors specified in section 4 (a)(1) of the Act, including:

Factor A (the present or threatened destruction, modification, or curtailment of its habitat or range).

Factor B (overutilization for commercial, recreational, scientific, or educational purposes).

Factor C (disease or predation).

Factor D (the inadequacy of existing regulatory mechanisms).

Factor E (other natural or manmade factors affecting its continued existence).

During this review, we found no new information indicating significant changes on how the above-mentioned Factors are affecting the overall status of erubia. The 2015 5-year review details these specifics (Service 2015). The primary threats to erubia continues to be the present or threatened destruction, modification, or curtailment of its habitat or range (Factor A), and other natural or manmade factors affecting its continued existence, such as hurricanes, drought, human-induced fires, and invasive species (Factor E).

Habitat modification and degradation has been identified due to urban expansion within the northern karst region of Puerto Rico and at Las Piedras del Collado. Presently, Las Piedras del

Collado area has been subjected to urban development and increase of visitation as tourist attraction due to the natural features and scenic views (Sustache, PRDNER, 2022, pers. comm). In addition, suitable habitat for the species in Puerto Rico has been degraded by current and historical land uses like coffee plantations, soil extraction/quarrying, road maintenance and lack of implementations of good practices for vegetation control (e.g., bulldozing vegetation), which have modified the vegetation structure of the sites where the species has been found (Sustache, 2022, pers. comm). Natural growth of vegetation (e.g., vines, shrubs) at these sites also seem to affect the recruitment of new erubia individuals (Service 2015). Changes in climate (i.e., increased intensity of hurricanes and tropical storms, followed by extended periods of drought), human-induced fires, and invasive species are all still considered current and future threats to the species. Because fire does not naturally occur in the habitats where this species is found, human-induced fires can encourage invasive species that outcompete erubia. Similarly, extensive drought or extreme weather events associated with climate change can change the plant community and soil characteristics (Service 2015 and references therein). We have no information indicating that overutilization for commercial, recreational, scientific, or educational purposes (Factor B), diseases and predation (Factor C), and inadequacy of existing regulatory mechanisms (Factor D) pose a significant threat for the species. The above-mentioned threats are exacerbated by erubia's limited distribution, fragmented habitats, low number of individuals, and small population size, which make them vulnerable to natural and stochastic events, such as hurricanes and climate change (i.e., changes in precipitation). Additionally, these characteristics likely reduce their ability to adapt to changing environmental conditions.

### **Synthesis**

Erubia is a small spiny shrub native to subtropical wet forests of Puerto Rico and was listed as endangered due to its extremely low population size and by direct effects of habitat destruction or modification (such as urban and development, agricultural practices, among others). Presently, the species is only known from three populations with a total that is likely lower than 200 individuals. Currently, the overall status of this species is unknown and the lack of knowledge on the species has hampered its recovery efforts. We continue to believe that erubia is still threatened by destruction, modification, or curtailment of its habitat due to urban expansions and the current and historical land uses where the species has been found, and by other natural or manmade factors affecting its continued existence in the form of human-induced fires, invasive species, and climate change (e.g., hurricanes and tropical storms). The restricted number of populations and low number of individuals make these threats moderate to high in magnitude. Because of ongoing threats, the limited number of individuals, and the uncertainty about the current condition of the species, we believe that erubia continues to meet the definition of an endangered species.

**RESULTS**

**U.S. FISH AND WILDLIFE SERVICE  
STATUS REVIEW of Erubia (*Solanum dryophilum*)**

**Status Recommendation:**

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

- Downlist to Threatened
- Delist (*Indicate reasons for delisting per 50 CFR 424.11*):
  - The species is extinct*
  - 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, species remains listed as endangered

**FIELD OFFICE APPROVAL:**

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

Approve \_\_\_\_\_ Date \_\_\_\_\_

\* Since 2014, Southeast Region Field Supervisors have been delegated authority to approve 5-year reviews that do not recommend a status change.

## RECOMMENDED FUTURE ACTIVITIES

1. Comprehensive surveys on erubia should be conducted in areas where the species was traditionally found and in non-traditional sites that based on current knowledge may harbor suitable habitat for the species.
2. Develop a plan for the long-term monitoring of known erubia populations to determine its status, establish population trends and to increase knowledge on its biology.
3. The populations that are actively producing fruits should be monitored to collect seed material for recovery purposes. Due to the absence of knowledge about its natural recruitment in the wild, enhancement of natural populations with propagated material should be considered a priority for the species.
4. Evaluate the feasibility for the long-term conservation of seed material (seed banking). Due to the lack of natural recruitment in the wild, *ex situ* conservation efforts should be considered a priority for erubia.

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