Lepanthes eltoroensis
(no common name)

5-Year Review:
Summary and Evaluation

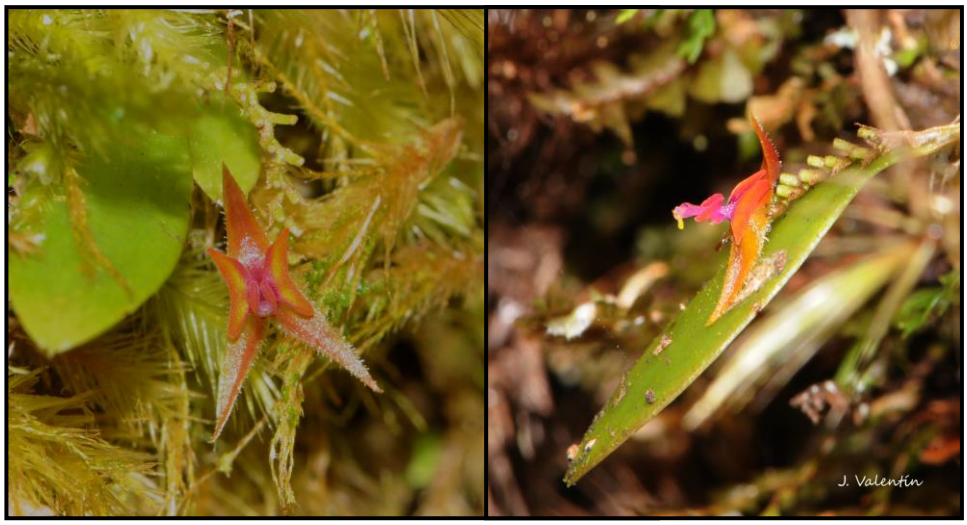

Photo by: Jennifer Valentín (USFWS)

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

5-YEAR REVIEW
Lepanthes eltoroensis

I. GENERAL INFORMATION

A. Methodology used to complete the review: On September 27, 2006, the U.S. Fish and Wildlife Service (USFWS) published a notice in the *Federal Register* (71 FR 56545) announcing the 5-year review of the orchid *Lepanthes eltoroensis* (no common name), and requesting new information concerning the biology and status of the species. A 60-day comment period was opened; however, no information was received from the public during the comment period.

This 5-year review was prepared by the lead USFWS recovery biologists for this plant and summarizes information that we have gathered in the species file since it was listed in 1991. The sources of information used for this review included the recovery plan for *L. eltoroensis*, field reports from Service biologists and scientific reports from the species' experts, as well as peer reviewed scientific publications.

We sent this document for peer review to the leading species expert who is located at the University of Puerto Rico (Humacao Campus). Comments and recommendations received were evaluated and incorporated in the 5-year review accordingly (see Appendix A). Therefore, we believe we have included the best available information on this orchid species in this review.

B. Reviewers

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

Lead Field Office: Jennifer Valentín and Xiomara Labiosa, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico. (787) 851-7297, extension 225 and 222.

C. Background

1. Federal Register Notice citation announcing initiation of this review: September 27, 2006; 71 FR 56545.

2. Species Status: Improving. The information currently available for the species and information collected during a rapid assessment conducted by Service biologists and Dr. Tremblay in 2014, suggest that the species is improving. The species is located within a designated Wilderness Area in El Yunque National Forest (EYNF; formally known as the Caribbean National Forest). Thus, no anthropogenic threats are anticipated.

3. Recovery Achieved: 1 (1= 0-25%) of species recovery objectives achieved.

4. Listing History

Original Listing

FR notice: 56 FR 60933
Date listed: November 29, 1991
Entity listed: species
Classification: endangered

5. Associated rulemakings: None.

6. Review History:
The Final Rule to list this orchid species under the Endangered Species Act of 1973, as amended (Act) was published on November 29, 1991 (56 FR 60933). The Recovery Plan developed for this species was approved and signed on July 15, 1996 (USFWS 1996). These two documents are the most recent comprehensive analyses of the status of the species and are used as the reference point documents for this 5-year review.

Every year the Service reviews the status of listed species and update species information in the Recovery Data Call (RDC). The last RDC for the *L. eltoroensis* was completed in 2014. Recovery Data Call: 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014.

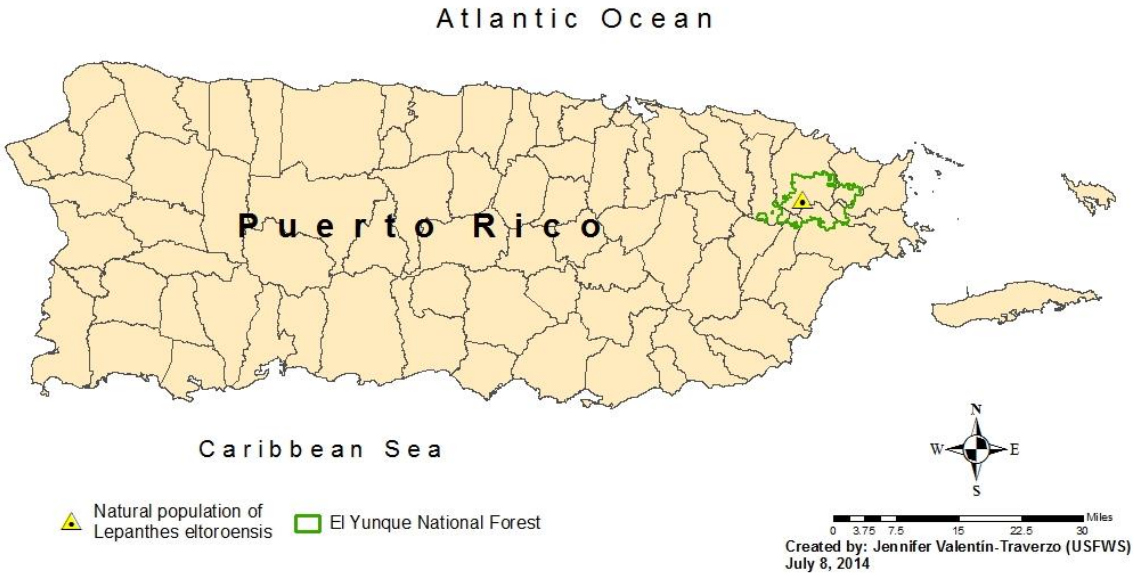

Figure 1. Map showing the natural population of *Lepanthes eltoroensis* in Puerto Rico (USFWS 2014 data).

7. Species' Recovery Priority Number at start of review (48 FR 43098): 5.
At the time of listing, *L. eltoroensis* was recognized as a species with a high degree of threat and a low recovery potential (RPN = 5).

8. Recovery Plan:
Name of plan: *Lepanthes eltoroensis* and *Cranichis ricartii* Recovery Plan.
Date issued: July 15, 1996.

II. Review Analysis

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

The Act defines species to include any distinct population segment of any species of vertebrate wildlife. This definition limits listing as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the DPS policy is not applicable to plant species, it is not further addressed in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

L. eltoroensis has an approved recovery plan establishing reclassification from endangered to threatened as the recovery objective. The recovery plan provides criteria for reclassification (see B.3.below); however, it does not provide recovery criteria for delisting. Principal recovery actions shared include the protection of existing populations and their habitats, and the establishment of self-sustaining populations in protected areas through the prevention of habitat loss and population decline; gathering of information on its distribution and abundance; conducting research on habitat requirements, reproductive biology and ecology; and establishing new populations.

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?

No. Since the recovery plan was approved in 1996, information has been collected on distribution and dispersion patterns (Tremblay 1997a), variance in floral morphology (Tremblay 1997b), and genetic differentiation (Tremblay and Ackerman 2001) of *L. eltoroensis* in Puerto Rico. Additional recent studies on other species of *Lepanthes* are important as well because the range of many species overlap (Esquilín and Tremblay 1999) and factors affecting their distribution and survival may be similar for *L. eltoroensis* (Bayman *et al*. 1997, Tremblay 1997c, Tremblay and Ackerman 1993, Tremblay et al. 1998). Thus, the new information on the ecology of other species of *Lepanthes* may provide useful information for the management and recovery *of L. eltoroensis*.

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

No.

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 approved recovery plan established that *L.eltoroensis* could be considered for reclassification when; (1) an agreement between USFWS and the USDA Forest Service (USFS) concerning the protection of this orchid species within the EYNF has been developed and implemented, and (2) new populations capable of self-perpetuation (the number of which should be determined following the completion of appropriate recovery actions) have been established within protected areas. Recovery criteria for delisting were not provided.

Criterion (1). This Criterion for reclassification has been met. The habitat where the species is found is considered a remote remnant of pristine vegetation infrequently visited by the public. This area is protected and managed for conservation. The EYNF has an existing management plan which provides general management actions for all federally listed species. Furthermore, any action proposed by EYNF with the potential to affect federally listed species or their habitat is consulted with the Service through section 7 of the Act. Moreover, the U.S. Congress enacted the Caribbean National Forest Act of 2005 on July 26, 2005, to designate approximately 10,000 acres of land in the EYNF as wilderness and as a component of the National Wilderness Preservation System in accordance with the Wilderness Act (16 U.S.C. 1131 *et seq*.). The location where *L. eltoroensis* is found is within the lands designated by Congress as El Toro Wilderness area. This Act prohibits certain activities within the designated territory, except for the fulfillment of minimum requirements for the administration of the area. The prohibition includes: temporary roads, use of motor vehicles, motorized equipment, landing of aircraft, any form of mechanical transport, and structures or installations within the designated area. As directed by the National Forest Management Act (NFMA), the USFS is drafting the El Yunque National Forest's Revised Land Management Plan (forest plan) and will also prepare an Environmental Impact Statement (EIS) for this revised forest plan. This plan is expected to account for the protection and conservation of listed species within the forest, including *L. eltoroensis*.

Criterion (2). This Criterion has not been initiated. So far, new populations capable of self-perpetuation have not been established within protected areas. Based on the best available information, *L. eltoroensis* remains as endemic to EYNF. Due to the specific habitat requirements of the species, any new population should be established within EYNF. However, we believe this action is not necessary at this time because additional population and individuals have been found since the species was listed. Furthermore, the currently known populations appear to be healthy. A rapid assessment conducted by Service biologists in 2014 found healthy individuals, including seedlings, juveniles, and adults of *L. eltoroensis*.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Species' abundance, population trends (*e.g.* increasing, decreasing, stable), demographic features, or demographic trends

L. eltoroensis is a small, epiphytic orchid about 1.57 inches (4 centimeters) tall which is distinguished from other members of the genus by its obovate to oblanceolate leaves, ciliate sepals, and the length of the inflorescence (Vivaldi et al. 1981; Ackerman 2014). The inflorescence is a long, peduncled raceme (flower cluster with flowers on separate short stalks) with reddish flowers. *L. eltoroensis* is found growing on moss-covered trunks of upper elevation forests in the sierra palm, palo colorado, and dwarf forest associations of the EYNF (Ewel and Whitmore 1973). Relative humidity in these forest types ranges from 90 to 100 percent, and cloud cover is continuous during the evening hours and the majority of the day (55 FR 41248).

L. eltoroensis was listed as endangered due to its rarity, restricted distribution, specialized habitat to the dwarf forest, and vulnerability to habitat destruction or modification (56 FR 60933). The recovery plan reports that *L. eltoroensis* is restricted in distribution to one general area within the sierra palm, palo colorado, and dwarf forests of the El Toro Trail in EYNF, Puerto Rico; at elevations above 2,461 feet (750 meters) (USFWS 1996). The species has been observed using the moss-covered trunks of several tree species, and it appears to face the non-windy side of the tree (Tremblay and Velazquez-Castro 2009; Tremblay 2008). Although the recovery plan reports a population of approximately 360 individuals of *L. eltoroensis*; Ackerman (UPR-Río Piedras, pers. comm., 2007) indicates that the population appeared stable at about 1,000 individuals during his visit near El Toro trail in July 2007. The distribution of *L. eltoroensis* has not changed (remains endemic to El Yunque). Recent estimates indicate that the total number of *L. eltoroensis* is estimated to be in the range of 3,000 individuals (Tremblay 2008). However, this estimate is based on surveys along the existing Trade Winds Trail, and based on Tremblay's opinion further populations may occur within suitable habitat outside this trail. Thus, a survey including habitat outside traditional population sites may result in additional undetected individuals.

On February 14, 2014, Service biologists in conjunction with Dr. Raymond Tremblay, faculty of the University of Puerto Rico in Humacao and Río Piedras campuses, conducted a rapid assessment of one of the currently known populations of *L. eltoroensis* in the Trade Winds trail at EYNF (Valentín and Labiosa, USFWS unpublished data, 2014). During this visit, we located at least 198 healthy individuals, including seedlings, juveniles, and adults. Also, we observed flowers and fruits (Valentín and Labiosa, USFWS unpublished data, 2014). This assessment did not represent an entire survey of the population because only a short segment of the trail was assessed.

b. Species' genetics, genetic variation, or trends in genetic variation (*e.g.*, loss of genetic variation, genetic drift, inbreeding, etc.:

Recent data strongly suggests that conditions are present for genetic drift in three species of *Lepanthes* in Puerto Rico (*L. eltoroensis*, *L. rubripetala*, and *L. rubipestris*), that may enhance population differentiation (Tremblay and Ackerman 2001). The effective population size was found to be extremely small for all three species, indicating that gene flow and selection must be large for genetic drift to be unimportant in the evolution of these species. Thus, rapid genetic differentiation of these orchids with similar dispersion patterns and reproductive variance is expected (Tremblay and Ackerman 2001).

Tremblay (1997a) found large morphological variance among populations of *L. eltoroensis*, *L. rubripetala*, and *L. rubipestris*, even though populations that share a common gene pool and similar environment are expected to share similar phenotypes and be more similar to each other than populations separated by large distances. It was suggested that, if the morphological variance among populations of these species is not dominated by phenotypic plasticity, then genetic drift and founder effects may be responsible for much of the variance in morphological characters among populations because of the low gene flow and small population size (Tremblay 1997a).

c. Taxonomic classification or changes in nomenclature:

No taxonomic or nomenclatural changes are known for the species.

d. Spatial distribution, trends in spatial distribution (*e.g.*, increasingly fragmented, increased numbers of corridors, etc.), or historic range:

No new information exists regarding the specie's spatial distribution, trends in spatial distribution or historic range for the species.

e. Habitat or ecosystem conditions (*e.g.*, amount, distribution, and suitability of the habitat or ecosystem):

No new information addressing habitat or ecosystem conditions is known for the species.

f. Other relevant information on species:

Researchers conducted a study to evaluate the effect of relocation of *L. eltoroensis* as a management strategy to improve and maximize survival, and reproductive success of this species after hurricane events (Benítez and Tremblay 2003). The study conducted in June 2000 consisted in evaluating the populations along the Trade Winds trail and the El Toro trail two years after Hurricane Georges struck the Island. Benítez and Tremblay (2003) monitored plants on the fallen trees and plants that where transplanted from fallen trees into standing trees for a period of two years. Their results suggested that plants already established on fallen trees had lower survival probability than transplanted

individuals. Therefore, the authors recommended relocation or transplanting as a viable strategy for the conservation of this species (Benítez and Tremblay 2003).

2. Five Factor Analysis

(a) Present or threatened destruction, modification, or curtailment of its habitat or range.

The Final Rule (USFWS 1991) and Recovery Plan (USFWS 1996) listed forest management practices such as establishment and maintenance of plantations, selective cutting, trail maintenance, and shelter construction as a threat to *L. eltoroensis*. The Recovery Plan further indicates that destruction and modification of habitat may be the most significant factors affecting the number and distribution of the species. However, neither document explicitly indicates how destruction or modification of this species' habitat has impacted *L. eltoroensis*, or what potential future activities would modify its habitat. Scientists who have conducted research on *L. eltoroensis* do not consider destruction, curtailment or modification of this species' habitat to be a factor currently threatening this species (Ackerman, UPR-Río Piedras, pers. comm., 2007; Tremblay, UPR-Humacao, pers. comm., 2007), because the El Toro trail and the Trade Winds trail where the species is found receives few visitors, and minimal maintenance. Furthermore, that section of the forest was designated by the U.S. Congress as a Wilderness Area, where habitat modification is prohibited.

As mention above, the EYNF has an existing management plan which provides general management actions for all federally listed species. Furthermore, a section 7 consultation is required if there is any proposed action that could affect federally listed species or their habitat. In addition, the USFS is drafting the El Yunque National Forest's Revised Land Management Plan (forest plan), which is expected to include conservation actions for the listed species occurring at EYNF.

The number of individuals of *L. eltoroensis* documented in the recovery plan has increase from 360 to 3,000. Based on the expert opinion and our rapid assessment in 2014, we believe that additional populations of the species may occur within the forest. However, it is expected that additional individuals will occur in remote areas, not frequently visited by the public, and not subject to habitat modification cause by humans.
Based on the above information, we no longer consider this factor as a threat to the species.

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

The final listing rule and recovery plan stated that taking for commercial or recreational purposes apparently eliminated a population of *L. eltoroensis*, based on scars that were observed on palm trees within the EYNF (Vivaldi et al. 1981). Ackerman (UPR-Río Piedras, pers. comm., 2007) believes that, although collection of *L. eltoroensis* next to El Toro trail is a possibility (given that he has observed evidence of collection of other orchid species in Mt. Britton), the small size (less than 2 inches tall) and

inconspicuousness of this species reduces the likelihood of collection. Tremblay (UPR-Humacao, pers. comm., 2007) concurs that the threat of collection is low, because few people venture into El Toro trail and the species is easily overlooked.

Currently, we are not aware of overutilization of this species for commercial or recreational purposes and the species is not considered of ornamental value. Additionally, Federal regulations 36 CFR 261.9 (FSM 2673.1) from the USFS prohibit collection of listed plant species in wilderness areas. Therefore, we do not consider overutilization as a current threat to the species.

(c) Disease or predation.

The Final Rule states that disease and predation have not been documented as factors in the decline of *L. eltoroensis* (USFWS 1986). This factor is not currently considered a threat and we have no data indicating that this factor could pose a threat to the species.

(d) Inadequacy of existing regulatory mechanisms.

The Final Rule states that Federal listing would provide interim protection to *L. eltoroensis*, and enhance its future protection and possibilities for recovery (USFWS 1986).

L. eltoroensis is protected by Commonwealth Law No. 241-999, known as the New Wildlife Law of Puerto Rico (*Nueva Ley de Vida Silvestre de Puerto Rico*). The purpose of this law is to protect, conserve and enhance both native and migratory wildlife species; declare all wildlife species within its jurisdiction property of Puerto Rico; regulate permits, regulate hunting activities, and regulate exotic species, among others. Article 5 of Law No. 241-1999 prohibits collection and hunting of wildlife species (including plants) within the jurisdiction of Puerto Rico without a permit from the Secretary of the Puerto Rico Department of Natural and Environmental Resources (PRDNER). This law also requires authorization from the Secretary of the PRDNER for any action that may affect the habitat of any species.

In 2004, the PRDNER approved the Regulation 6766 to regulate the management of threatened and endangered species in the Commonwealth of Puerto Rico (*Reglamento 6766 para Regir el Manejo de las Especies Vulnerables y en Peligro de Extinción en el Estado Libre Asociado de Puerto Rico*). *L. eltoroensis* was included in the list of protected species of this regulation and designated as endangered. Article 2.06 of Regulation 6766 prohibits collecting, cutting, removing, among other activities, listed plant individuals within the jurisdiction of Puerto Rico.

At EYNF, the Caribbean National Forest Act of 2005 designated 10,000 acres (4,047 ha) as a component of the National Wilderness Preservation System to protect habitat for several federal trust species, such as *L. eltoroensis*. The designation of this wilderness area implies that the habitat has a special protection, where development is not permitted, and all kind of actions (e.g., building construction, trail maintenance, roads) in this area

require approval from the USFS. In addition, because of the Federal nexus, any action that may affect listed species within EYNF would require section 7 consultations under the Act. At present, the USFS is in the process of revising the EYNF management plan and the Service is committed to collaborate and provided assistance during the process.

As indicated above, there are existing Federal and Commonwealth regulatory mechanisms that provide protection to the *L. eltoroensis* and its habitat. Based on such mechanisms and the absence of evidence supporting lack of enforcement of regulations to protect this species, we believe that inadequacy of existing regulatory mechanisms should no longer be considered a threat to *L. eltoroensis*.

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

Hurricanes, Landslides and Climate Change

Hurricanes and tropical storms frequently affect the islands of the Caribbean. The Final Rule states that *L. eltoroensis* is more susceptible to natural disturbances such as major storms, because it is confined to geographically small areas and specialized habitats (USFWS 1986). The heavy rains and winds associated with tropical storms and hurricanes in the mountains of Puerto Rico often lead to landslides that can cause defoliation of trees and habitat modification due to fallen trees, which are part of the forest dynamics. Researchers believe that the opening of the canopy from fallen trees or defoliation may alter the microhabitat of *L. eltoroensis*, exposing the individuals to excessive light, increasing temperature and decreasing moisture, which reduce the survival probability of the species. Furthermore, these habitat modification events may encourage the overgrowth of vine and other weedy plants that may reduce light sufficiently or increase the competition for space, avoiding proper growth and recruitment of *L. eltoroensis* (Ackerman, UPR-Río Piedras, pers. comm., 2007; Tremblay, UPR-Humacao, pers. comm., 2007)

Change in climate may have direct and indirect impacts on species; and can exacerbate the effects of other threats (PRCCC 2013). The U.S. Global Change Research Program found that climate change can substantially alter ecosystem structure and function and the distribution of ecosystem services (PRCCC 2013). Staudinger et al. (2012) suggested changes in precipitation regimes and extreme events can causes ecosystem transitions, particularly the timing of reproduction of animals and plants, the length of the growing seasons, species distributions and population sizes. Moreover, climate change can compromise natural recruitment by affecting the reproduction and/or the survival of seedlings, juveniles and adult individuals (Staudinger et al. 2012).

The average temperatures at EYNF have increased over the past 30 years; however, climate models vary in the degree of warming (Still et al. 1999). Cashman et al. (2010) projected decreases in precipitation in the Caribbean, suggesting drier wet seasons, and even drier dry seasons. Dwarf forest epiphytes may experience moisture stress due to higher temperatures and less cloud cover with a rising cloud base, affecting epiphyte growth and flowering (Nadkarni and Solano 2002). Therefore, the average temperature

changes may alter the atmospheric circulation patterns decreasing precipitation in EYNF (Comarazamy et al. 2011). These changes in climate may cause adaptation, dispersal or declining of plant species. However, due to its specialized ecological requirements and restricted distributions within the dwarf forest, *L. eltoroensis* could be more adversely impacted by climate change than other species with wider distribution (e.g., lower elevation species) and plasticity.

We consider these threats to be moderate to high in magnitude, because the known individuals of this species are in a limited range; but not imminent, because threats like climate change are more long term threats and hurricanes/landslides are heavily dependent on natural factors.

3. Synthesis

L. eltoroensis was listed as endangered in 1991. At that time, approximately 140 individuals were known because of its restricted distribution to one general area within the sierra palm, palo colorado, and dwarf forests of El Toro Trail at EYNF (USFWS 1996).

Since the recovery plan was written, the population of the species was estimated to be about 1,000 individuals in six sub-populations (Ackerman, UPR, Río Piedras, pers. comm., 2007), all around the El Toro trail. However, recent estimates indicate that the numbers of *L. eltoroensis* are estimated to be in the range of the 3,000 individuals (Tremblay 2008). Based on the expert opinion and our rapid assessment in 2014, we believe that additional populations of the species may occur within the forest. Therefore, we recommend a comprehensive survey in order to get a more accurate overall estimate of the species.

The species appears to be improving, and seems to be threatened only by Factor E (Other natural or manmade factors affecting its continued existence). The most important natural factors threatening *L. eltoroensis* are severe tropical storms or hurricanes and climate change. These factors may result in changes in microclimatic conditions and thus, reduce the survival and recovery of the species. Habitat modification (Factor A) and overutilization (Factor B), as well as the inadequacy of existing regulatory mechanisms (Factor D), are no longer considered threats to *L. eltoroensis*. Disease and predation (Factor C) have never been considered threats to this species.

III. RESULTS

A. Recommended Classification:

__X__ No, no change is needed.

B. New Recovery Priority Number: 8

Based on the information gathered in the process of preparing this five year review, the majority of the threats considered at the time of listing no longer apply. The species remain endemic to EYNF, but the number of individuals is greater than originally thought. The species may remain threatened due to restricted distribution and habitat requirements, hurricanes and climate change. Nonetheless, *L. eltoroensis* evolved in this habitat and under the influence of tropical storms. Thus, we consider *L. eltoroensis* as a species with a low degree of threat and a high recovery potential.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Conduct a comprehensive survey within EYNF, including non-traditional areas, to determine the current status of the species.

2. Conduct a PVA to identify the number of viable individuals and populations necessary to protect and stabilize the *L. eltoroensis* population (wild, naturally-reproducing populations large enough to maintain sufficient genetic variation, and evolve and respond to natural habitat changes).

3. Obtain information on demographic (e.g., recruitment, growth rate), biological (e.g., breeding systems, genetic structure of the population), and ecological (e.g., intraspecific and interspecific interactions) aspects of *L. eltoroensis*.

4. Revise the Recovery Plan to reflect most up-to-date information on population size and biological information (such as the role of genetic diversity and gene flow on population structure), and to develop updated delisting criteria for the species.

5. Post-Hurricane Management: Conduct a survey of the populations along the Trade Winds and El Toro trails immediately posterior to a hurricane that has impacted EYNF. The survey should be aimed to determine the location and number of trees with orchids which are damaged and fallen, and the number of orchids on these trees and the size and stage of the orchids (e.g., number of leaves, etc.). Within no more than two months, orchids on fallen trees need to be relocated to trees with moss and preferably with other orchids. The orchids are more prone to dying during the period of high light and humidity exposure. Plants should be relocated on the north facing side (mossy side) of the tree to maximize survivorship. Follow up surveys every six months should be conducted to evaluate the successfulness of the relocation for at least 2 years.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Lepanthes eltoroensis*

Current Classification Endangered

Recommendation resulting from the 5-Year Review

_____ **Downlist to Threatened**
_____ **Uplist to Endangered**
_____ **Delist**
__X__ **No change is needed**

Appropriate Listing/Reclassification Priority Number N/A

Review Conducted By: Jennifer Valentín-Traverzo, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico

FIELD OFFICE APPROVAL:

Edwin E. Muñiz, Lead Field Supervisor, U.S. Fish and Wildlife Service

Approve Edwin Muñiz Date 5/21/2015

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve Date 8/24/15

Appendix A

Summary of peer review for the 5-year review of *Lepanthes eltoroensis*

We sent this document to the leading species expert (see below) via electronic mail. We indicated our interest in all comments the peer reviewer may have about *L. eltoroensis*, particularly any new additional information on the status and current threats to the species. Comments and recommendations received from the peer reviewer were evaluated and incorporated into the document and cited accordingly.

Peer Reviewer

Dr. Raymond L. Tremblay
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Dr. Tremblay indicated that the information included in this 5 year review is accurate. He shared a scientific report with new information that we used, particularly in Part II of this document. Also, he provided a recommendations regarding post-hurricane management for the species, which were incorporated accordingly.