

*Daphnopsis helleriana*  
(No common name)



Photo:USFWS

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

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

**5-YEAR REVIEW**  
*Daphnopsis helleriana*

**I. GENERAL INFORMATION**

**A. Methodology used to complete the review:** On February 20, 2009, the Service published a notice in the *Federal Register* (74 FR 7914) announcing the 5-year review of *Daphnopsis helleriana* and requesting new information concerning the biology and status of the species. We opened a 60-day public comment period with this notice; however, no information on *D. helleriana* was received from the public during the comment period.

This 5-year review prepared by a Service biologist summarizes new information since the species was listed on June 23, 1988, and the recovery plan was signed on August 7, 1992. In conducting this 5-year review, we relied on the best available information pertaining to historical and current distributions, life histories, habitats, and potential threats of this species. New information consists of unpublished field survey results, reports of research projects, peer reviewed scientific publications, unpublished field observations by the Service, State, and other experienced biologists, and personal communications. This draft 5-year review was shared with several peer reviewers (see Appendix A). Comments received were evaluated and incorporated as appropriate.

**B. Reviewers**

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

**Lead Field Office:** Maritza Vargas, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico. (787) 851-7297, extension 215.

**C. Background**

**1. Federal Register Notice citation announcing initiation of this review:** February 20, 2009; 74 FR 7914.

**2. Species Status:** Stable. When *D. helleriana* was listed in 1988, only 14 plants were known from two localities (Toa Baja and Dorado). Additional information compiled in the office suggests that approximately 500 individuals occur at seven locations throughout northern Puerto Rico (i.e., Dorado, Toa Baja, Isabela/Quebradillas, Arecibo/Utuado, and Vega Baja). Five of these localities are private lands subject to grazing, residential and tourism development, and quarrying activities. In 2006, an area of haystack hills at Sabana Seca Ward in the municipality of Toa Baja, which is adjacent to a natural population, was designated for conservation. This action could certainly help in the conservation of the species.

**3. Recovery Achieved:** 2 (2= 26-50 % of species' recovery objectives achieved).

**4. Listing History**

Original Listing

FR notice: 53 FR 23740  
Date listed: June 23, 1988  
Entity listed: species  
Classification: endangered

**5. Associated rulemakings:** Not Applicable.

**6. Review History:**

The final listing rule and the Recovery Plan for *Cornutia obovata* and *Daphnopsis helleriana* approved and signed on August 7, 1992 (USFWS, 1992), are the most comprehensive analyses of the species' status and are used as referenced point documents for this 5-year review.

*Daphnopsis helleriana* is a dioecious small tree or shrub known from the northwestern limestone hills of Puerto Rico. It belongs to the Tymelaeaceae family and is endemic to Puerto Rico. The recovery plan reported approximately 125 individuals of *D. helleriana* in four populations. These are the limestone hills near Isabela/Quebradillas, the Río Lajas hills in Dorado, the Nevarez limestone hills and near the Caribbean Primate Research Center in Toa Baja.

The Service conducted a 5-year review for *D. helleriana* in 1991(56 FR 56882). In this review, the status of many species was simultaneously evaluated with no in-depth assessment of the five factors as they pertain to the individual species. The notice stated that the Service was seeking any new or additional information reflecting the necessity of a change in the status of the species under review. The notice also indicated that if significant data were available warranting a change in a species' classification, the Service would propose a rule to modify its status. No new information was received. Therefore, the Service did not recommend a change in *D. helleriana*'s listing classification.

Every year the Service reviews the status of the species and incorporates the information in the Recovery Data Call. Recovery Data Call: 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, and 2012.

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

**8. Recovery Plan:**

Name of plan: Recovery Plan for *Cornutia obovata* and *Daphnopsis helleriana*  
Date issued: August 7, 1992.

## **II. Review Analysis**

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

The Endangered Species Act (ESA or 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 DPS to vertebrate species of fish and wildlife. Because the species under review is a plant, the DPS policy is not applicable.

### **B. Recovery Criteria**

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

Yes. The *D. helleriana* has an approved recovery plan, but it does not establish measurable criteria to delist the species. The plan does not define the number of individuals per population needed for a sustainable population.

#### **2. Adequacy of recovery criteria**

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

No. The plan does not include up-to-date information about *D. helleriana* numbers or distribution. New information on natural populations has been documented and efforts in establishing new populations in various Commonwealth Forests have been conducted.

##### **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 recovery plan specifies that *D. helleriana* may be considered for delisting when:

1. Areas of privately owned populations are given protected status.
2. At least three new self-sustaining populations in Commonwealth Forest units such as Vega Alta, Cambalache, or Guajataca Forests have been established.

Criterion 1 has been initiated. Efforts have been made to protect populations on privately owned lands. Through section 7 consultation and technical assistance, the Service has protected individuals within the scope of various development projects, by recommending conservation areas (e.g., Productoras de Agregados), and in other cases mitigation areas (e.g., Highway PR-10). Nevertheless, other populations within private lands have not been protected.

Criterion 2 has been initiated. Propagation and planting efforts are being conducted in three Commonwealth Forests of Puerto Rico: Río Abajo, Cambalache, and Guajataca. Approximately 49 individuals of *D. helleriana* have been planted in these forests. By conducting these efforts, we are making progress toward moving this plant to a self-sustaining status by having a bank to help restore the species. We are also able to learn more by studying these plants and revising techniques on how and where to propagate/introduce this species. This criterion is considered initiated because a number of the individuals planted are small trees and have not reached their maturity stage to fructify. Furthermore, the number of individuals needed to establish a self-sustainable population has not been established.

## C. Updated Information and Current Species Status

### 1. Biology and Habitat

#### a. Abundance, population trends (e.g., increasing, decreasing, stable), demographic features, or demographic trends:

The recovery plan stated that approximately 125 individuals of *D. helleriana* were found in four locations: the limestone hills near Isabela/Quebradillas, the Río Lajas hills in Dorado, the Nevarez limestone hills and near the Caribbean Primate Research Center in Toa Baja (USFWS 1992).

Information gathered from Productora de Agregados, Inc., a quarry company located in the municipality of Vega Baja (WREC 1996, WREC 1997), indicates that a population of approximately 463 individuals of *D. helleriana* was found within their property. A total of 260 individuals from this population were going to be relocated because of their quarrying activities. The remaining 203 individuals were located in a buffer zone left for conservation. In a telephone conversation with Mr. José A. Torres and Mr. Moisés Rivera (pers. comm. 2009), biologists for Productora de Agragados, Inc. in charge of the relocation and monitoring of *D. helleriana*, stated that relocation efforts were successful with minimal mortality of planted individuals. The current number of individuals at the site is unknown.

Santiago-Valentín and Rojas-Vázquez (2000) surveyed several areas to locate and obtain information on *D. helleriana*. They studied individuals at three locations: Guajataca River Gorge, Guajataca Commonwealth Forests, and Candelaria Ward (Sabana Seca), and reported 184 individuals of the species. Santiago-Valentín and Rojas-Vázquez (2000) could only confirm the sex of about 38% of the total individuals found (Table 1).

At the Guajataca River Gorge, individuals were located in two limestone terraces a few meters up from one to another. The majority of these individuals (81) were found in the lower terrace. In Guajataca Commonwealth Forest, *D. helleriana* was found in two trails: Ramón Morales 1 Trail with 48 individuals and Salomé Trail with 31 individuals. In Candelaria Ward (Sabana Seca), Santiago-Valentín and Rojas-Vázquez (2000) located 3

individuals near a locality reported in 1981 (Vivaldi and Woodbury 1981). Within this area, they also reported another federally listed species (Palo de Rosa, *Ottoschulzia rhodoxylon*) as well as other rare plants.

**Table 1.** Number of individuals with observed reproductive structures (Santiago-Valentín and Rojas-Vázquez 2000).

Locations	# of individuals	Confirmed Sex		
		Female	Male	Unconfirmed
<b>Guajataca River Gorge</b>	102	42	25	35
<b>Guajataca Commonwealth Forest</b>	79	3	1	75
Ramon Morales 1 Trail	48	1	0	47
Salome Trail	31	2	1	28
<b>Sabana Seca Area</b>	3	0	0	3
<b>Totals</b>	<b>184</b>	<b>45</b>	<b>26</b>	<b>113</b>

**Table 2.** Height range elevations reported for the three locations of *Daphnopsis helleriana* (Santiago-Valentín and Rojas-Vázquez 2000).

Locations	Number of individuals	Height (range) in meters	Elevation in meters
Guajataca River Gorge	102	0.3 - 5	50-90
Guajataca Commonwealth Forest	79	0.1 - 3.8	250-300
Sabana Seca Area	3	0.67	50-70

During the surveys conducted before the construction of Highway PR-10, approximately 2,047 individuals of *D. helleriana* were found within the proposed right of way of this highway. About 89% of the individuals (1,877) would be affected by the project construction. Therefore, most were relocated to minimize adverse effects. These individuals were relocated by personnel of the Puerto Rico Department of Natural and Environmental Resources (PRDNER) with a reported 38% survival rate (PRHTA 1995). Only 227 individuals were left *in situ* (PRHTA 1995 and Appendix B). Additionally, about 415 individuals were found in mitigation areas of this project (CSA Architects & Engineers 1996).

In 2006, the PRDNER established a protocol to propagate and monitor *D. helleriana* in Cambalache, Guajataca, and Río Abajo Commonwealth Forests. Productora de Agregados, Inc., provided 83 individuals to the PRDNER for the reintroduction project of *D. helleriana* in the forests mentioned above (PRDNER 2006). From the original 83 individuals, 29 individuals remained in the Cambalache greenhouse because they were too small to be planted. The PRDNER left those individuals for future reintroduction

(PRDNER 2006). Table 3 shows the distribution of the plants among the three Commonwealth Forests (PRDNER 2006).

**Table 3.** Summary of planted individuals during 2006 in three Commonwealth Forests in Puerto Rico (PRDNER 2006, a, b, c).

Commonwealth Forests (CF)	Individuals provided for reintroduction per forest	Individuals planted	Confirmed Sex		Unknown Sex
			Female	Male	
Río Abajo CF	19	16	2	1	13
Cambalache CF	13	13	4	4	5
Guajataca CF	22	20	2	0	18
<b>Total</b>	<b>54</b>	<b>49</b>	<b>8</b>	<b>5</b>	<b>36</b>

New gathered information indicates that the number of known individuals has increased to about 904 (723%) more individuals documented since the recovery plan. This increase is the result of individuals found in new locations and is not growth in the historical populations. These 904 individuals do not include the individuals that were relocated and or introduced in Commonwealth Forests. However, only 33% of the natural individuals remain undisturbed (Table 4).

Table 4. Summary of Disturbed and Undisturbed Populations Reported (Santiago-Valentín and Rojas-Vázquez 2000; WREC 1996; WREC 1997; PRHTA 1995 and Appendix B).

Location	Municipality	Number of Individuals	Number of Undisturbed individuals	Total number of relocated individuals
Productora de Agregados Inc,	Vega Baja	463	203	260
Guajataca Gorge	Isabela/ Quebradillas	102	102	0
Guajataca CF	Isabela/ Quebradillas	79	79	0
Sabana Seca	Toa Baja	3	3	0
Highway PR-10 project area	Arecibo/Utuado	2014	227	1787
Mitigation area for Highway PR-10	Arecibo/Utuado	415	415	0
<b>Total</b>		<b>3076</b>	<b>1029</b>	<b>2047</b>

**b. Genetics, genetic variation, or trends in genetic variation:** There is no new information about the genetics or genetic variability of *D. helleriana*.

**c. Taxonomic classification or changes in nomenclature:**

The nomenclatural name of *D. helleriana* was published in the final rule. However, the correct name should have been published as *Daphopsis helleriana*. Following the International Code of Botanical Nomenclature, the correct name should be written as in the first publication of the species. This was confirmed searching in *Symbolae Antillanae: seu Fundamenta Florae Indiae Occidentalis* (1901) and confirmed in ITIS (Interagency Taxonomic Information System, downloaded on November 30, 2012). *Daphnopsis hellerana* is considered a synonym. We intend to correct this nomenclature in 50 CFR 17.12.

**d. Spatial distribution, trends in spatial distribution, or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):**

The recovery plan establishes that *D. helleriana* was found in four locations in three municipalities: Isabela, Dorado, and Toa Baja. Since then, at least three new locations have been found. At present, *D. helleriana* is found in the municipalities of Isabela/Quebradillas, Arecibo, Vega Baja, Dorado, and Toa Baja. New natural locations are near or within the right of way of Highway PR-10 in Arecibo, within Río Abajo Commonwealth Forest in Arecibo, and Productoras de Agregados, Inc., in Vega Baja. Introduced individuals, are located in Guajataca, Río Abajo, and Cambalache Commonwealth Forests.

Figure 1. Location of Natural Population of *Daphnopsis helleriana* near Highway PR-2 and Guajataca River in Isabela, Puerto Rico (Santiago-Valentín and Rojas-Vázquez 2000).

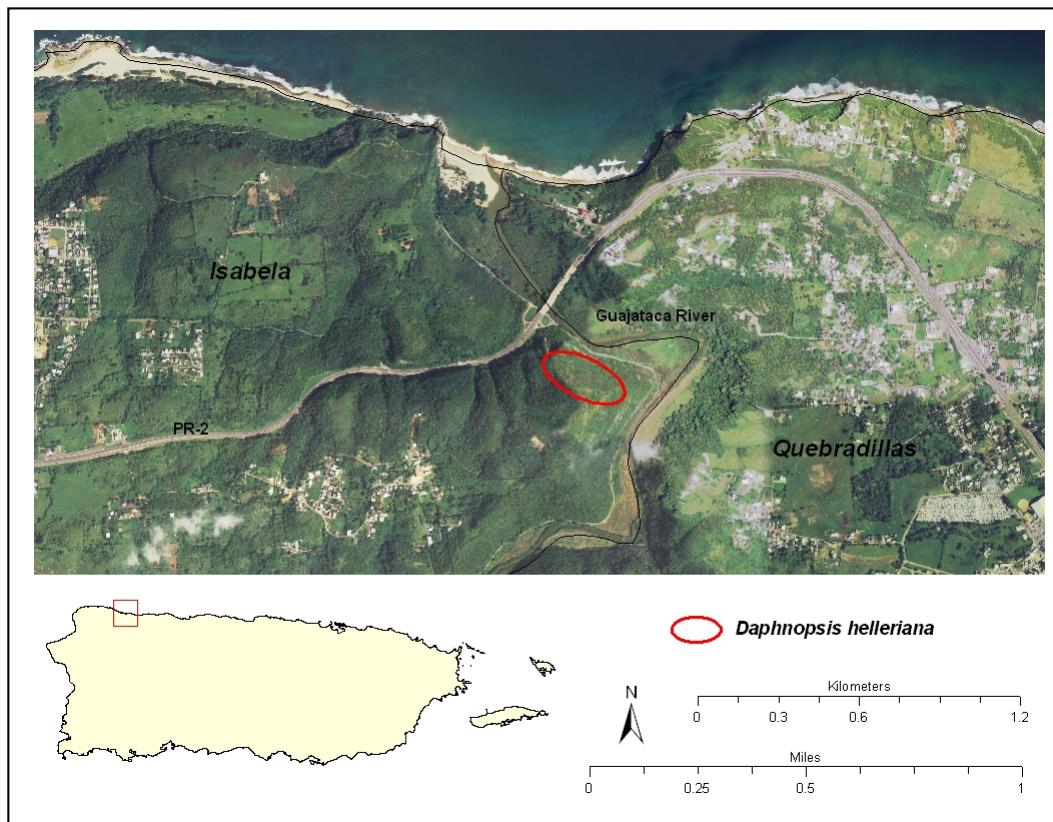
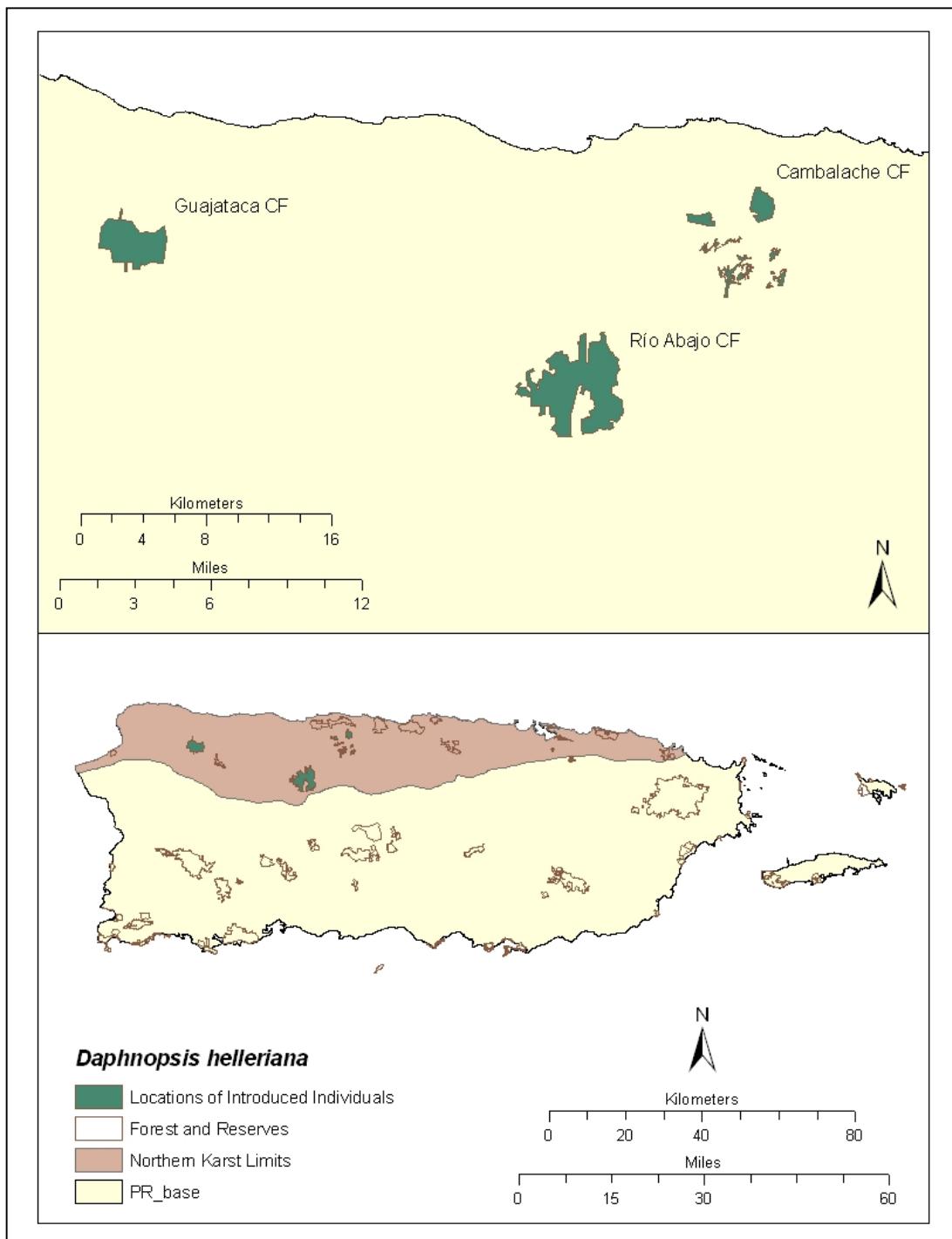


Figure 2. Location of Commonwealth Forests within the Northern Karst Limits  
(PRDNER 2006)



Note: Map created by CESFO in 2009. Sources include USFWS, PRDNER and Puerto Rico Planning Board data.

Figure 3. Natural and Introduced Populations of *Daphnopsis helleriana* in Guajataca Commonwealth Forest, Isabela (Santiago-Valentín and Rojas-Vázquez 2000, PRDNER 2006).

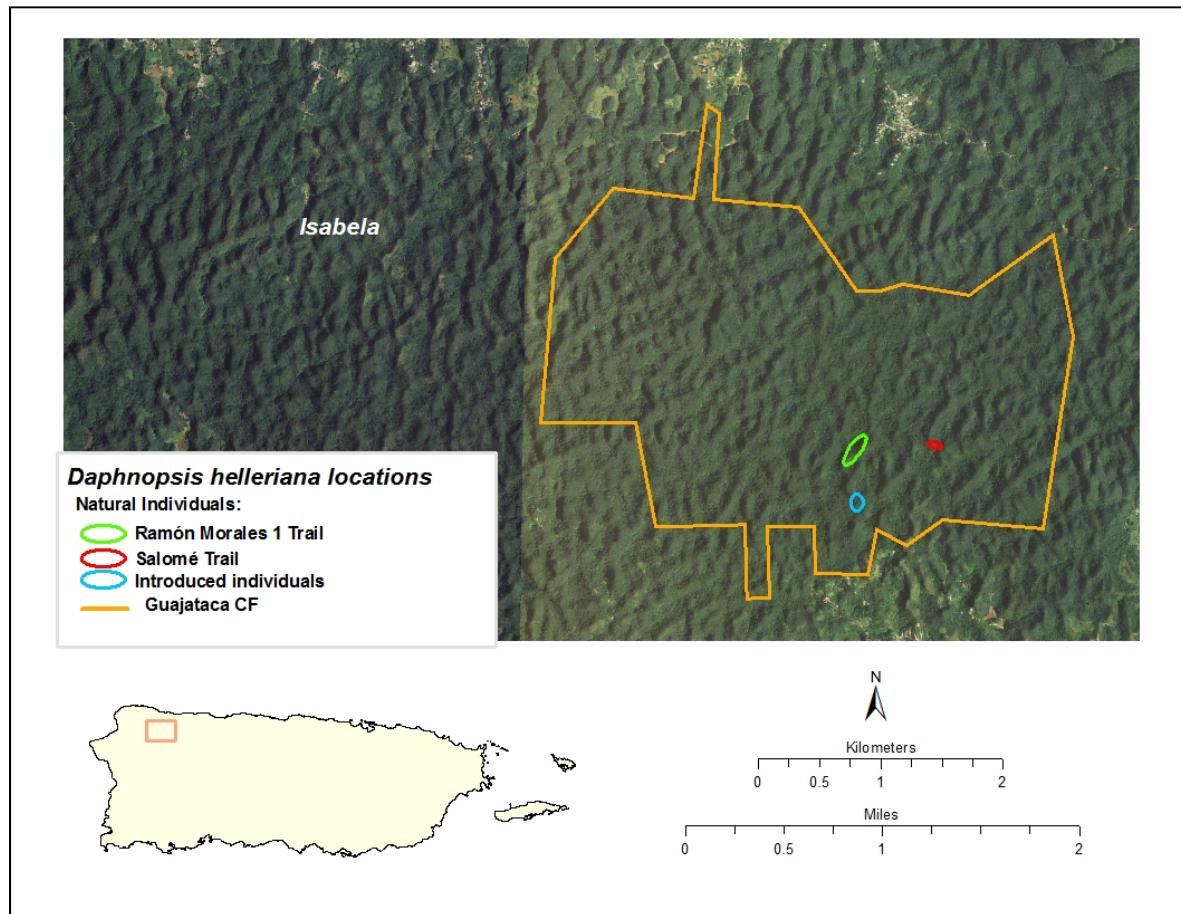


Figure 4. Natural and Introduced Populations of *Daphnopsis helleriana* in Río Abajo Commonwealth Forest, Arecibo-Utuado (CSA Architects & Engineering 1996, DNER 2006).

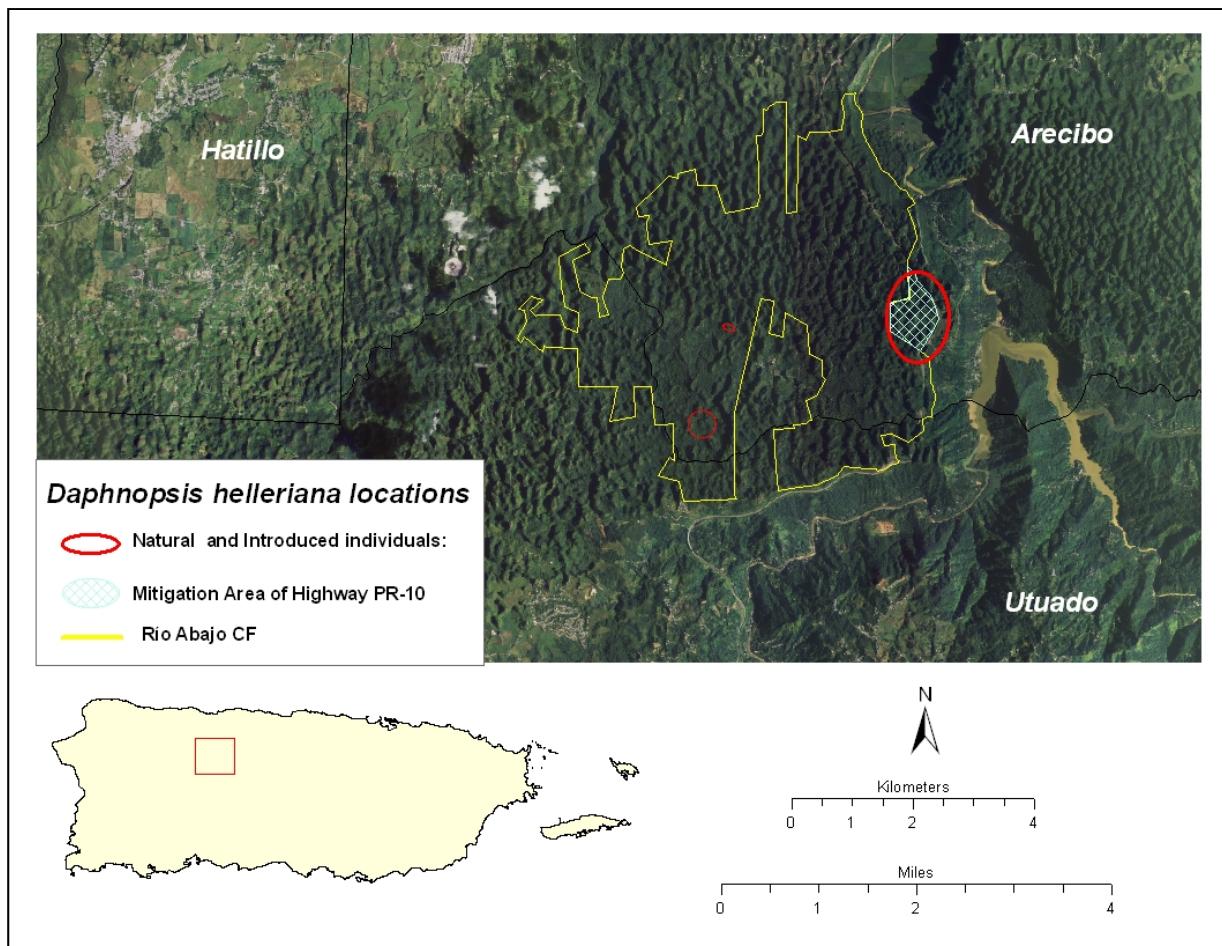


Figure 5. Introduced Population of *Daphnopsis helleriana* located at Cambalache Commonwealth Forest, Arecibo (PRDNER 2006).

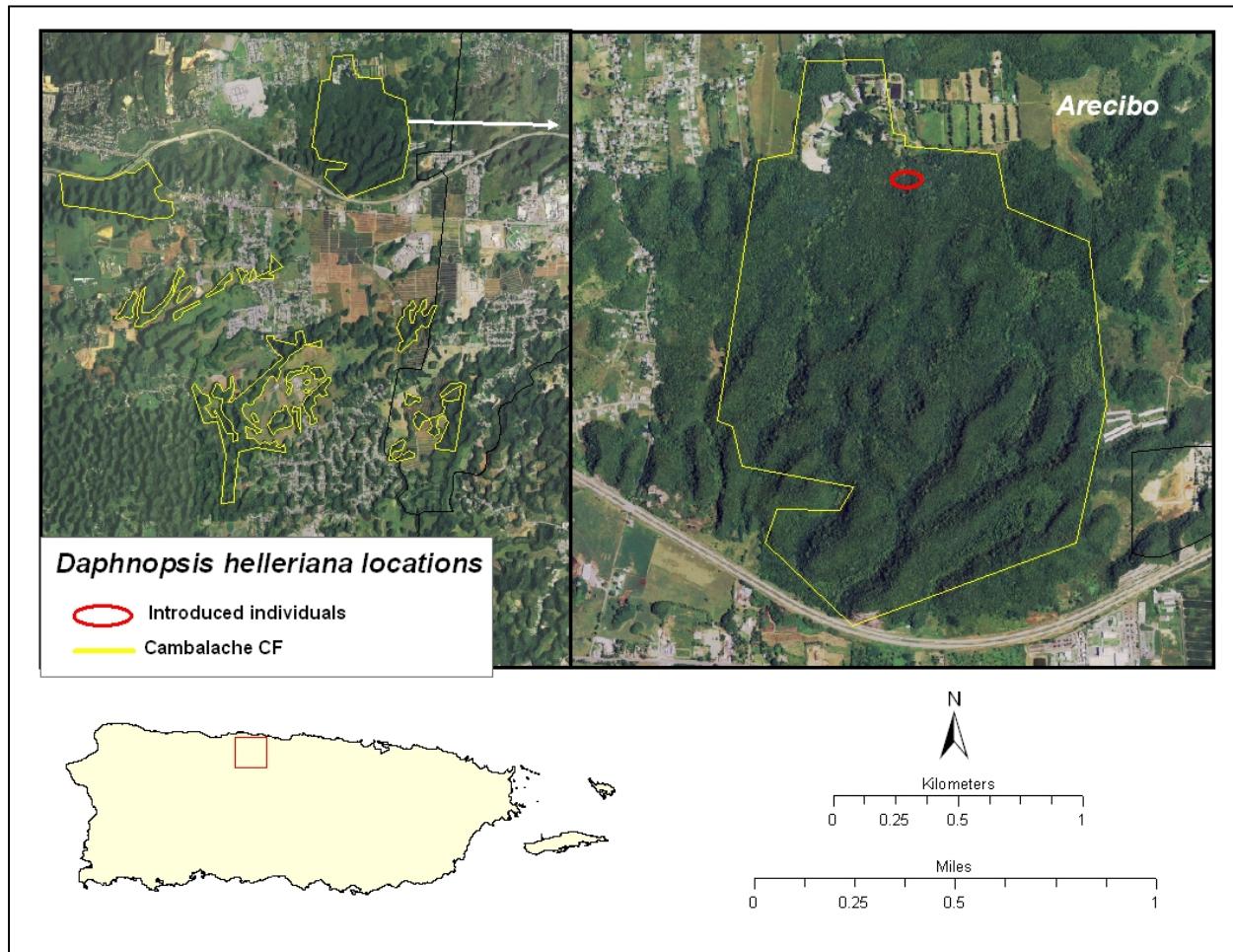


Figure 6. Natural Population of *Daphnopsis helleriana* located at Productora de Agregados, Inc., Vega Baja (WREC 1996).

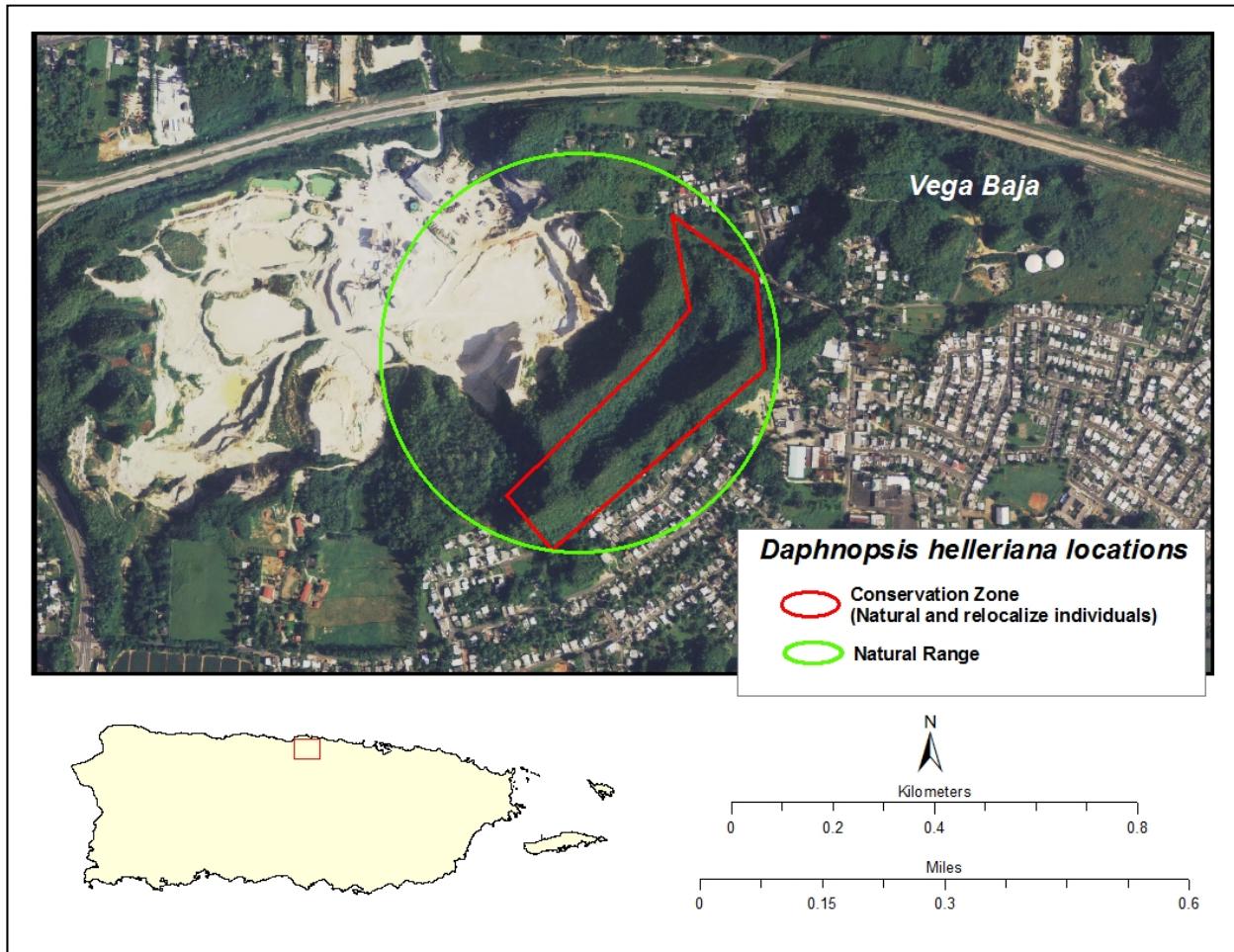
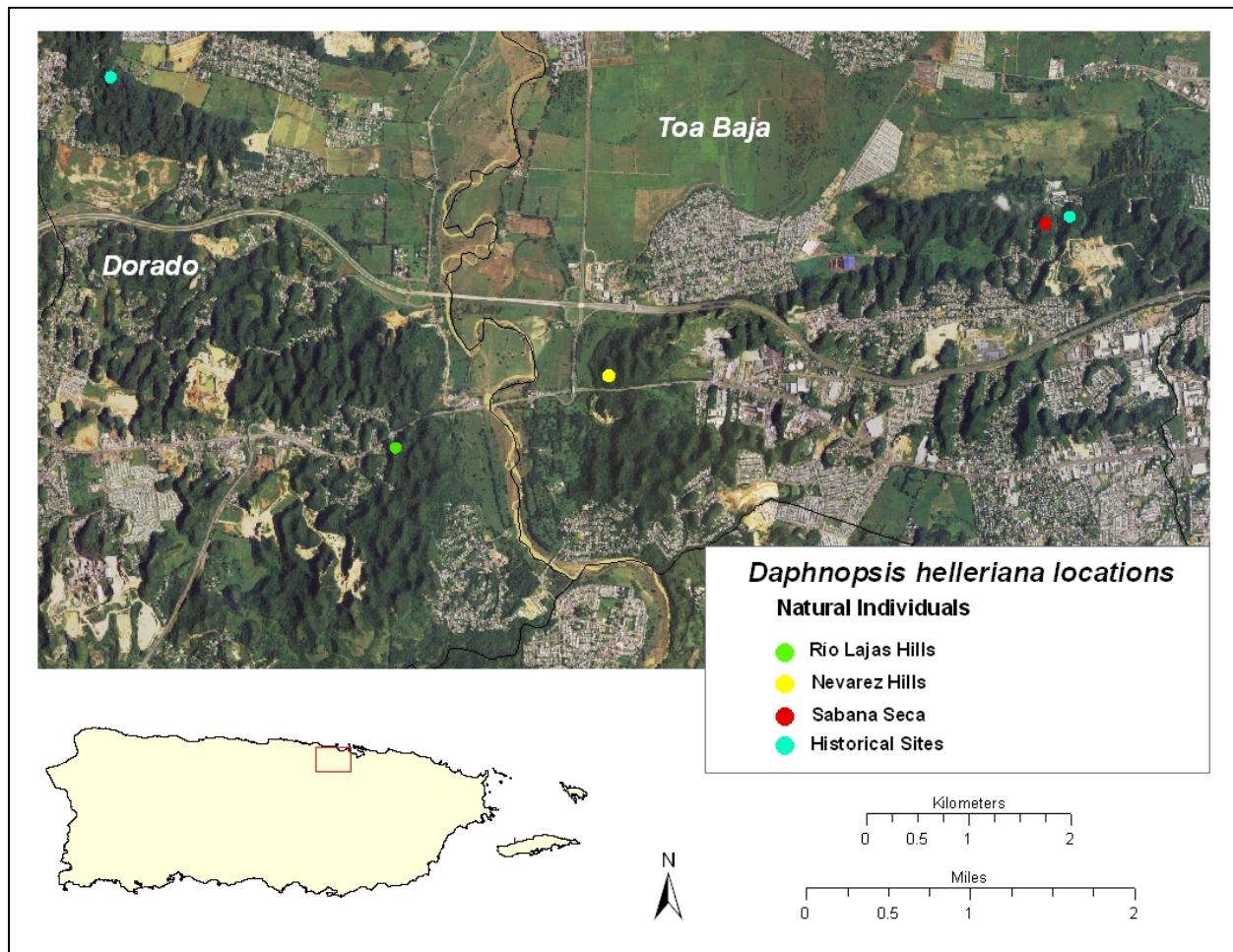


Figure 7. Natural Populations of *Daphnopsis helleriana* in Dorado and Toa Baja, Puerto Rico (Vivaldi and Woodbury 1981, Santiago-Valentín and Rojas-Vázquez 2000).



## 2. Five Factor Analysis

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

In the final rule, habitat destruction and modification were identified as a threat affecting this species.

The majority of the natural populations of *D. helleriana* occur in areas under high pressure for urban development and expansion. Residential, tourist and commercial development projects (e.g., landfills, construction of dwellings and roads, and limestone quarrying) threaten this species. During the last decade, the Service reviewed numerous projects in the northern karst region of Puerto Rico, where the known populations of *D.*

*helleriana* are known to exist. We have provided technical assistance to numerous federal, state and local agencies regarding the protection and conservation of threatened and endangered species. For example, in the expansion of Highway PR-10 from Ponce to Arecibo, a project of the Puerto Rico Highway and Transportation Authority (PRHTA), the goal was to minimize adverse effects to *D. helleriana* and to several other species that occur in the area. Even though the extensive efforts were made to conserve and protect *D. helleriana*, the relocation of the individuals was only 38% successful, resulting in the loss of more than seven hundred individuals. This was detrimental to the species because this was the largest population known to exist. On the other hand, the relocation project of Productores de Agregados, Inc., was very successful (Jose A. Torres and Moises Rivera, pers. comm. 2009). The PRDNER granted a permit to Productores de Agregados, Inc., for relocation of *D. helleriana* with the condition that survival of individuals would not be less than 80 % once the trees were removed from the wild to the nursery. They reached a survival of 86 % for those individuals.

The PRHTA is currently planning the expansion of the Highway PR-22 from Hatillo to Aguadilla. The preferred proposed route is located south of one of the existing populations of *D. helleriana* in Isabela, where adverse effects are not anticipated on the species. However, if the PRHTA changes the preferred route, other alternative routes may affect the species restricting its habitat or eliminating the northern population of Isabela.

As indicated above, new populations of *D. helleriana* have been found within different proposed development projects. If these populations had not been disturbed, the species would have higher numbers (approximately 3076 individuals). Only 33% of the natural individuals remain undisturbed.

Based on the information gathered during this review, we believe that the species is threatened by habitat modification because of urban development pressure.

**(b) Overutilization for commercial, recreational, scientific or educational purposes;**  
The Service does not have information suggesting that overutilization is a threat to the species at this time.

**(c) Disease or predation;**

At present, the Service is not aware of any diseases that affect this species and does not have documentation of its predation. Therefore, we do not consider disease or predation as threats.

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

At the time of listing, *D. helleriana* was not protected by laws and regulations of the Commonwealth of Puerto Rico. At present, local laws and regulations protect the species. In 1999, the Commonwealth of Puerto Rico approved Law No. 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: declare property of Puerto Rico all wildlife species within its jurisdiction, regulate permits, regulate hunting activities, and regulate exotic species among others. In 2004, the PRDNER 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 the Commonwealth of Puerto Rico). In this Regulation, *D. helleriana* was designated as “critically endangered”, which means that the specie faces an extremely high risk of extinction in the near future. Regulation 6766 under Article 2.06, prohibits collecting, cutting, removing, among other activities, listed plant individuals within the jurisdiction of Puerto Rico.

Based on the presence of Commonwealth laws and regulations protecting *D. helleriana*, and the absence of evidence supporting lack of enforcement of regulations to protect this species, we believe that inadequacy of existing regulatory mechanisms is no longer a threat to this species. However, it is important to note that enforcement on private lands continues to be a challenge as accidental damage or extirpation of individuals may occur due to lack of knowledge of the species by private landowners.

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

*Daphnopsis helleriana* is a dioecious plant (i.e., male and female flowers are born in different plants). This entails that a self-sustainable population needs to have both female and male specimens for them to reproduce. The best available information does not give us a good picture on demographic features of this plant. However, the low numbers in the currently known natural populations give us an indication that the populations are at risk. In addition, the low numbers may result in adverse effects in reproduction and genetic diversity, which may result in single sex individuals. This could be very significant because it may eliminate the population’s ability to continue reproducing. In addition, with respect to the relocation of individuals to other suitable locations, this poses a risk that particular genotypes of each population may be lost due to the specific characteristics of that habitat.

Based on the rarity of a dioecious plant, and the reduction in the probability of successful reproduction in the wild, other natural or manmade factors are considered a threat to the species.

**D. Synthesis**

*Daphnopsis helleriana* is a dioecious small tree or shrub known from the northwestern limestone hills of Puerto Rico. The recovery plan (1992) reported approximately 125 individuals of *D. helleriana* in four populations. In this status review it was found that there are other known natural populations, and efforts have been made to introduce the species in Commonwealth forests in the northern limestone area of Puerto Rico. At one time, the northern karst had approximately 3,076 individuals of *D. helleriana* in six localities (Guajataca Gorge, Guajataca Commonwealth Forest, along the route of

Highway PR-10, the mitigation area of Highway PR-10, in the Productora de Agregados, Inc., and in Sabana Seca Ward area. All these localities are within the municipalities of Isabela/Quebradillas, Arecibo, Vega Baja, Dorado and Toa Baja, Puerto Rico. At present time, approximately 2047 individuals of *D. helleriana* have been affected by two projects, and only 1,029 individuals (33%) remain undisturbed in their natural localities.

Based on the information gathered for this review, we believe that *D. helleriana* continues to be threatened by habitat destruction and modification because the species occurs in an area very susceptible to urban development and expansion. Residential, tourist and commercial development, landfills, construction of dwellings and roads, and limestone quarrying continue to threaten the species. In addition, the Service believes that natural factors are threatening the species because of the rarity of the plant. Furthermore, being dioecious reduces its probability of successful reproduction in the wild. Therefore, we believe this plant continues to meet the definition of an endangered species.

### **III. RESULTS**

#### **A. Recommended Classification:**

**X No, no change is needed.**

#### **B. New Recovery Priority Number: 5c**

*Daphnopsis helleriana* remains subject to a high degree of threat due to urban development. The species' recovery potential continues to be low because of its rarity and dioecious life form. The conflict category 'c' has been added to the recovery priority number because the species is in conflict with development and growth.

### **IV. RECOMMENDATIONS FOR FUTURE ACTIONS**

- The recovery plan should be revised to establish measurable delisting criteria as new information is learned on this plant. The Service, in cooperation with the PRDNER and academia, needs to determine how many individuals constitute a self-sustainable population.
- Efforts to protect privately-owned populations should be conducted. Private-lands initiatives (such as Partners for Fish and Wildlife and Coastal Program) are needed to further protect the areas where *D.helleriana* is known to occur naturally.
- Foster a working partnership with regulatory agencies to address and minimize potential adverse effects of development projects on the species and its habitat.

- Surveys are needed to have a better demographic perspective of the population
- Obtain information regarding pollination, seed dispersal, and population genetics for the *D. helleriana*.

## V. REFERENCES

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**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of *Daphnopsis helleriana***

**Current Classification** Endangered

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

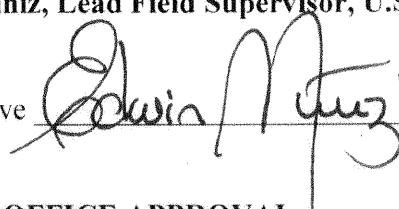
- Downlist to Threatened  
 Uplist to Endangered  
 Delist  
 No change is needed

**Review Conducted By** Maritza Vargas, Caribbean Field Office, Boquerón, Puerto Rico

**FIELD OFFICE APPROVAL:**

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

Approve



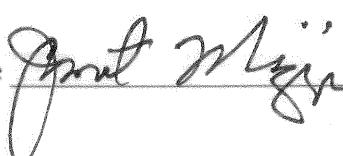
Date

4/12/2013

**REGIONAL OFFICE APPROVAL:**

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

Approve



Date

7/19/13

## **Appendix A. Summary of peer review for the 5-year review of *Daphnopsis helleriana* (No common name)**

**A. Peer Review Method:** We requested peer review from several knowledgeable individuals. We indicated our interest in all comments the reviewers may have about *Daphnopsis helleriana*, specifically in any additional information on the status and the current threats of the species. The due date of the peer review comments was on December 31, 2012. Responses were received from one of these peer reviewers.

### **List of Peer Reviewers**

Dr. Eugenio Santiago  
Department of Biology  
University of Puerto Rico, Río Piedras Campus  
Box 23360  
San Juan, Puerto Rico 00931-3360  
Phone: 787-764-0000, ext. 2905  
E-mail: [goetzea@yahoo.com](mailto:goetzea@yahoo.com)

Dr. James D. Ackerman  
Department of Biology  
University of Puerto Rico, Río Piedras Campus  
Box 23360  
San Juan, Puerto Rico 00931-3360  
Phone: 787-764-0000, ext. 2023  
E-mail: [jdackerman@uprrp.edu](mailto:jdackerman@uprrp.edu)

Mr. José Sustache  
Department of Natural and Environmental Resources  
P.O. Box 9066600  
San Juan, Puerto Rico 00940  
Phone: 787-999-2200, ext. 2642  
E-mail: [jsustache@drna.gobierno.pr](mailto:jsustache@drna.gobierno.pr)

Dr. Pedro Acevedo  
National Museum of Natural History  
MRC-166/Botany  
Smithsonian Institution  
PO Box 37012  
Washington, DC 20013-7012  
Phone: 202-633-0963  
E-mail: [acevedop@si.edu](mailto:acevedop@si.edu)

**B. Summary of Peer Review Comments:** Peer reviewer responses were supportive of the information and conclusions presented in this review. It was brought to our attention that the

survival of *Daphnopsis helleriana* in the relocation of Productores de Agregados was about 86% and that they yielded an annual report to the PRDNER until the relocation process concluded. In addition, the peer reviewer brought to our attention that there could be a natural risk with the species relocation on other areas (habitats).

- C. Response to Peer Review:** The Service was in agreement with all comments and concerns received from peer reviewers. Comments were evaluated and incorporated into the 5-year review where appropriate.