

Thomas' Lidflower
(*Calypttranthes thomasi*)



Photo by Pedro Acevedo, obtained from the Internet (www.arkive.org)

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
Thomas' Lidflower / *Calyptranthes thomasi*

I. GENERAL INFORMATION

A. Methodology used to complete the review: On April 9, 2010, the U.S. Fish and Wildlife Service (the Service) published a notice in the *Federal Register* (75 FR 18232) to announce the 5-year review of the *Calyptranthes thomasi*, and to request new information concerning the biology and status of the species. A 60-day comment period was opened. No comments were received from the public during this public comment period.

When *Calyptranthes thomasi* was originally listed, it was given no common name. However, Thomas' Lidflower seems to be well accepted by the scientific community as its common name (Please refer to the "taxonomy" section in this document for more details). Therefore, we intend to use Thomas' Lidflower as the common name for *Calyptranthes thomasi* in this document and from this point forward.

This 5-year review was finalized by the lead Service recovery biologist and summarizes the information that has been gathered in the Thomas' Lidflower file since the plant was listed in 1994. The sources of information used for this review included the original listing rule for the species, the recovery plan for the Thomas' Lidflower, peer-reviewed literature, personal communications with qualified biologists and experts on the species, and information provided by the University of Puerto Rico, Mayagüez campus (UPRM). The Service and the UPRM signed a cooperative agreement to gather and summarize new information on Thomas' Lidflower. Under this agreement, Drs. Duane A. Kolterman and Jesús D. Chinea provided the Service with a draft review compiling all available information on Thomas' Lidflower. They conducted literature research on the species, consulted with other specialists, and examined herbarium data from the University of Puerto Rico at Mayagüez (MAPR), Río Piedras Botanical Garden (UPR), University of Puerto Rico at Río Piedras (UPRRP), Puerto Rico Department of Natural and Environmental Resources (PRDNER), New York Botanical Garden (NY), US National Herbarium (US), and University of Illinois (ILL).

We did not seek additional peer review on this 5 year review since Drs. Kolterman and Chinea, as well as Service biologist, Omar Monsegur, are leading experts on this and other plants that share habitat with Thomas' Lidflower. For this review, we believe they gathered the best available information on this species.

B. Reviewers

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Lead Field Office: Carlos Pacheco, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico. (787) 851-7297, extension 221.

C. Background

1. Federal Register Notice citation announcing initiation of this review: April 9, 2010; 75 FR 18232

2. Species Status: Unknown. The populations of Thomas' Lidflower have been poorly monitored and no information on population trends and demographic features are currently available. Last population survey was conducted in 1986 (Proctor 1992). Its rarity and limited distribution in only two localities (one of which is not under U.S. jurisdiction) make this species vulnerable to habitat modification by stochastic events (i.e., hurricanes) and management practices (i.e., road improvement and wild domestic mammal). The status of the Thomas' Lidflower is unknown because of lack of updated information on the species' distribution and abundance.

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

4. Listing History

Original Listing

FR notice: 59 FR 8138

Date listed: February 18, 1994

Entity listed: species

Classification: endangered

5. Associated rulemakings: Not applicable

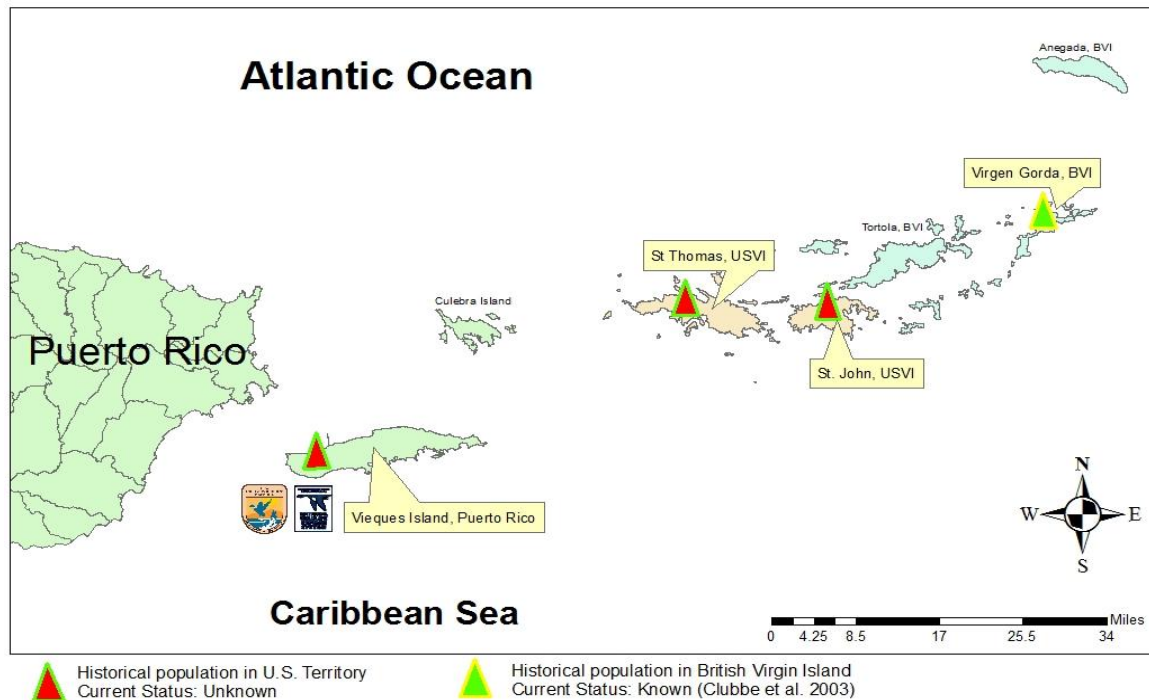
6. Review History:

The February 18, 1994, final rule (59 FR 8138) and the Recovery Plan for *Calypttranthes thomasi*, approved on September 30, 1997 (USFWS 1997), are the most comprehensive analyses of the species' status and are used as the reference point documents for this 5-year review.

Thomas' Lidflower (Family Myrtaceae) was described by Ernst von Berg in 1855 from specimens collected by unknown collector from an undetermined location in St. Thomas, U.S. Virgin Islands (USVI; Proctor 1992). In 1925, Nathaniel L. Britton and Pierce Wilson identified the locality of "Signal Hill" and "Bolongo" as the collection site in St. Thomas (Britton and Wilson 1925). Subsequently, Roy O. Woodbury and José L. Vivaldi rediscovered the species at a top of hill north of Bolongo Bay, St. Thomas (DNR 1980, unpubl. data). In 1992, George R. Proctor conducted the first study on the species. In his report, the author mentioned that Thomas' Lidflower was found in Monte Pirata, Vieques Island, by Woodbury on an unrecorded date; at Bordeaux Mountain in St. John by Acevedo, Woodbury, and Matusak on June 7, 1985; and in Gorda Peak, Virgin Gorda, by Proctor on July 19, 1986 (Proctor 1992).

In the final listing rule for this plant (59 FR 8138), the Service reviewed the best scientific and commercial information available, analyzed the five listing factors and their application to this species and listed Thomas' Lidflower as endangered. At the time of listing, Thomas' Lidflower was known from four populations; three within the U.S. Territory and one under British Virgin Island jurisdiction (Figure 1). The Service identified Factor A (present to threatened destruction, modification, or curtailment of its habitat or range), Factor D (the inadequacy of existing regulatory mechanisms), and Factor E (other natural or manmade factors affecting its continued existence) as the main threats to the species. The recovery plan signed on September 30, 1997 (USFWS 1997), includes a description of the species and information about its distribution, habitat characteristics, reproductive biology and conservation. The information provided in the recovery plan will not be repeated in this review.

Figure 1. Historical distribution of Thomas' Lidflower (*Calypttranthes thomasi*) in Puerto Rico, U.S. Virgin Islands and British Virgin Islands (USFWS 2012).



Every year the Service reviews the status of listed species and updates species information in the Recovery Data Call (RDC). The last RDC for Thomas' Lidflower was completed in 2012. 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): 11. At the time of listing, Thomas' Lidflower was recognized as a species with moderate degree of threat and a low recovery potential.

8. Recovery Plan:

Name of plan: Recovery Plan for *Calyptanthus thomasi*
Date issued: September 30, 1997

II. REVIEW ANALYSIS

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

The Endangered Species Act (Act) defines species to include any distinct population segment of any species of vertebrate wildlife. This definition limits listings 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? Yes. Thomas' Lidflower has an approved recovery plan (USFWS 1997) establishing delisting as the recovery objective. However, the recovery plan contains only measurable recovery criteria for downlisting and does not have fully measurable reclassification 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. When the recovery plan was signed, very little information on the species' biology, life history, and habitat requirements was available. Still, at present we do not know the status of the species in its limited populations.

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 Plan established that the species could be considered for reclassification from endangered to threatened when the following criteria are met:

1. An agreement between the U.S. Fish and Wildlife Service and the U.S. Navy has been prepared and implemented for the protection of the known population on Vieques;
2. An agreement between the U.S. Fish and Wildlife Service and the National Park Service has been prepared and implemented for the protection of the known population on St. John; and
3. New populations (the number of which should be determined following the appropriate studies) capable of self-perpetuation have been established in protected areas such as other areas on Vieques or St. John.

These are minimum requirements, and could be expanded upon if the regenerative or propagative potential of natural and ex situ populations proves to be insufficient. Alternatively, if new populations of the species are discovered, it may be preferable to place greater emphasis on protection rather than on propagation in order to achieve the minimum number of plants necessary for recovery.

Criterion 1 is obsolete. On May 1, 2001, approximately 3,100 acres (1,220 hectares) comprising the Conservation Zone in Vieques designated in Section IV of the 1983 Memorandum of Understanding between the Commonwealth of Puerto Rico and the Secretary of the Navy were transferred to Department of the Interior. It also directed the DOI to administer the Conservation Zone transferred to it as a wildlife refuge under the National Wildlife Refuge System Administration Act of 1966 (16 United State Code [USC] 688 dd). The individuals identified as a Thomas' Lidflower population at Vieques occurred within this conservation zone. However, recent information available to us demonstrates that the species was misidentified. Axelrod (2011) indicated that according to Dr. Gary Breckon (UPRM, unpubl. data), the specimen identified as *Calyptranthes thomasi* from Vieques is currently identified as *Myrcianthes fragans*. Therefore, we believe based on the best available information that Thomas' Lidflower does not occur on Vieques and we believe that this criterion is not valid any longer.

Criterion 2 has not been achieved as stated in the recovery plan. Currently, the Service and the National Park Service (NPS) have not signed an agreement for the protection of Thomas' Lidflower within the Virgin Islands National Park in St. John, USVI. However, NPS has regulatory mechanism to protect the species within the Virgin Island National Park. The NPS is responsible under its Organic Act (16 U.S.C. §1) for managing the national parks to conserve the scenery and natural and historic objects and the wildlife. The National Park Omnibus Management Act of 1998 (Pub. L. 105-391, Sec. 1(a), Nov. 13, 1998, 112 Stat. 3497), Title II, "*National Park System Resource Inventory and Management*" giving a research mandate to the NPS to support resource management decisions (16 U.S.C. 5936). This law affects not only the National Park Service, but other federal agencies, universities, and other entities that conduct research in the National Park Systems. Currently, the NPS has implemented its resource management responsibilities through its Management Policies, Section 4.4, which states that "it will maintain as part of the natural ecosystems of parks all plants and animals native to the park ecosystem". Section 207 of the Omnibus Management Act of 1998 allows NPS to withhold from the public information related to the nature and specific location of endangered, threatened, or rare species unless disclosure would not create an unreasonable risk of harm to the species (16 U.S.C. § 5937). The regulatory mechanism discussed above allows NPS to protect the species on their lands. Therefore, an agreement between the Service and the NPS for the protection of the Thomas' Lidflower in St. John may no longer be necessary. Instead, the Service and the NPS should develop a plan with specific actions for the management and enhancement of existing populations.

Criterion 3 has not been achieved. The Service has little information about attempts to propagate Thomas' Lidflower within and outside of U.S. Territories. The Center for Plant Conservation (CPC) under its program "Ex situ Conservation of Threatened and Endangered Species in National Park" collected four seedlings of Thomas' Lidflower from St. John to maintaining it in green house at the Fairchild Tropical Botanical Garden facilities in Florida (Maschinski 2012, unpublished data). Clubbe *et al.* (2003) indicated that as part of their conservation program, the British Virgin Islands (BVI) National Park Trust is developing a horticultural protocol in an attempt to establish the species in *ex situ* cultivation at the JR O'Neal Botanic Garden on Tortola, establishing four seedlings in cultivation. Although species' experts have attempted to propagate Thomas' Lidflower, there is no information about the minimum number of individuals needed per population or the species' habitat requirements. Therefore, until the species is propagated in U.S. territory and the population dynamics are studied so we have enough information to determine what constitutes a viable population, this criterion will not be met.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Species' abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g. age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends

At the time that the recovery plan was approved, Thomas' Lidflower populations consisted of 10 to 12 individuals in Vieques, about 100 mature individuals in St. John, and about 100 individuals in Virgin Gorda (USFWS 1997). However, new information on the Thomas' Lidflower indicates that the species' population has decreased since the time of listing in 1994 (Table 1). Clubbe *et al.* (2003) cited that work in the BVI has documented a single locality on Virgin Gorda that comprises two subpopulations, one with 34 and another with 25 mature individuals, making a total population size for Virgin Gorda at 59 individuals within Gorda Peak National Park. With respect to the population from Vieques, recently, species' experts excluded the species from that island. Axelrod (2011) indicated that according to Dr. Gary J. Breckon (retired professor from UPRM), the specimen collected from Vieques is *Myrcianthes fragans* not Thomas' Lidflower. In addition, Dr. Breckon conducted extensive surveys on Vieques as part of his work on the flora of that Island and dedicated particular effort on *Calyptanthes thomasi*; however, never found the species (UPRM, unpubl. data). Therefore, the previous record of the species from Vieques is considered as a misidentification and it has been concluded that the species does not occur on Vieques (Axelrod 2011). Moreover, unfortunately the six specimens cited in the Botanical Research and Herbarium Management System (BRAHMS) database collected from St. John, and the two from Virgin Gorda provide no information on the status of those populations (e.g., number of individuals, evidence of flowering, evidence of natural recruitment, etc.) (<http://herbaria.plants.ox.ac.uk>). BRAHMS is a flexible database management system for botanical researchers and herbaria that provide wide-ranging and innovative

functionality to gather, edit, analyze and publish botanical data, optimizing its use for widest possible range of curation services and research output.

Overall, the populations of Thomas' Lidflower have been poorly monitored and there is no information on its abundance, population trends, and demographic features. Based on the new information regarding the species no longer considered as occurring in Vieques, and the decrease in number of individuals per populations in BVI and USVI, we believe that Thomas' Lidflower population trend should be considered as decreasing.

Table 1. Number of individuals of Thomas' Lidflower per known populations in Puerto Rico, and the U.S. and British Virgin Islands (USFWS unpubl. data, 2013).

Location	Historical Species abundance (# of adults plants)	Current Species abundance (# of adults plants)
Monte Pirata, Vieques NWR, PR	12	0 (Axelrod 2011)**
Bordeaux Mountain, St. John, USVI	100	100* (USFWS 1997)**
Gorda Peak National Park, Virgin Gorda, BVI	100	59 (Clubbe et al 2003)**
Signall Hill and Bolongo Bay, St. Thomas, USVI	1	0 (Clubbe et al 2003)**
Total	213	159

*Number based on historical records, no information of current population status available.

**Source of information.

b. Genetics, genetic variation, or trends in genetic variation (e.g. loss of genetic variation, genetic drift, inbreeding, etc)

No information on the genetic variability within the species was found during this review, but the restricted range and limited number of individuals reported to date may suggest a low level of genetic variation. Overall, the genetics, genetic variation, and trends of Thomas' Lidflower are poorly known and no information on loss of genetic variation, genetic drift, etc., is currently available.

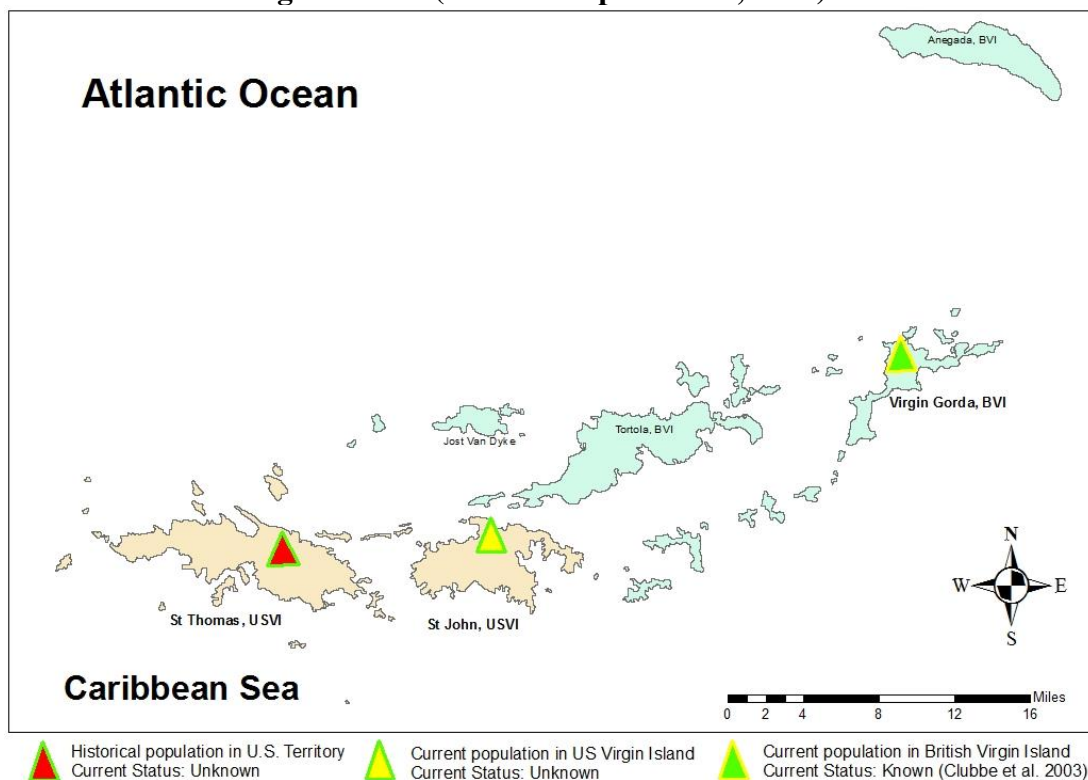
c. Taxonomic classification or changes in nomenclature.

No recent taxonomic or nomenclatural changes are known for the species, even in spite of the taxonomic difficulties among genera of Tropical American Myrtaceae (Duane Kolterman and Jesús D. China, UPRM, unpubl. data, 2012). It may be pointed out that the recovery plan for *Calypttranthes thomasiana* (USFWS, 1997) cites "no common name" but Thomas' Lidflower seems well established: Lidflower is the common name in English for other *Calypttranthes* species and Thomas is an appropriate geographical reference. This common name has been adopted by both the USDA PLANTS database and the IUCN Red List. Therefore, the Service intends to use this common name for this federally listed plant.

d. Spatial distribution, trends in spatial distribution, or historic range.

At the time of listing, Thomas' Lidflower was reported from small populations from four islands: Vieques (PR), St. John and St. Thomas (USVI), and Virgin Gorda (BVI) (Clubbe *et al.* 2003). After reviewing the information available on the species, we found that the current distribution of Thomas' Lidflower has been reduced to USVI and BVI. The species is believed to be extirpated from St. Thomas due to the urban development at the collection site (Proctor 1992, Clubbe *et al.* 2003). Moreover, the species has been excluded from Vieques due to misidentification of the specimens collected at Monte Pirata in Vieques (Axelrod 2011). Currently, the species is known only from St. John and Virgin Gorda (Figure 2). In Virgin Gorda, only two small subpopulations (approximately 30 individuals each) are found within the Gorda Peak National Park (Clubbe *et al.* 2003). In St. John, Thomas' Lidflower has a limited geographic range that may reflect a remnant population of the species whose habitat has been altered or lost due to the agricultural practices such as cultivation of sugar cane and cotton (USFWS 1997). At present, status of the species at St. John is unknown.

Figure 2. Current distribution of Thomas' Lidflower (*Calyptanthes thomasi*) in U.S. and British Virgin Islands (USFWS unpubl. data, 2012).



Thomas' Lidflower has very limited spatial distribution at its localities (Figure 3). Drs. Kolterman and China (UPRM), evaluated nine specimens deposited in herbarium between 1980 and 1999, and mapped their collection site using the information provided in the labels (D. Kolterman and J. China, UPRM, UPRM, unpubl. data, 2012). The six

specimens cited in the MAPR BRAHMS database were collected by Pedro Acevedo (US Herbarium, Smithsonian Institution) and collaborators between 1985 and 1999, four of them from St. John and two from Virgin Gorda ((D. Kolterman and J.Chinea, UPRM, unpubl. data, 2012). They used the point-circle method (Chapman and Wieczorek 2006) that assigns coordinates for the location of the collection as well as an estimate of the uncertainty (in meters) based on the locality descriptions obtained from the specimen labels of such localities.

Figure 3. Available specimen localities for the Thomas' Lidflower (*Calypttranthes thomasi*). Accurate specimen localities were those with uncertainties smaller than 300 meters. The Virgin Gorda locality is partially covered by the island name. Locality (> 8 km) includes all reported sites with specimens or populations (Duane Kolterman and Jesús D. Chinea, UPRM, unpubl. data, 2012).



e. New information addressing habitat or ecosystem condition (

Thomas' Lidflower occurs primarily within the subtropical moist forest life zone, perhaps extending into the subtropical dry forest zone (USFWS 1997). Thomas' Lidflower is reported to exist in the moist forest type at the Gorda Peak National Park in Virgin Gorda at altitude between 300-400 m (984-1312 feet). In St. John, the species is found in the moist forest life zone but on the windward side of the Bordeaux Mountain where the

effects of the wind make it a drier forest type. Rainfall ranges from 600 to 1,100 mm (24-44 in.) per year in the subtropical dry forest and from 1,100 to 2,200 mm (44-88 in.) per year in the subtropical moist forest (Ewel and Whitmore 1973). These Holdridge life zones occupy areas that were extensively deforested for agriculture. Areas in which agricultural activities have been abandoned and reforestation has occurred may provide possible sites for the establishment of new populations of the species. Accurately described specimen localities and documented populations in USVI occur on soils derived from volcanic bedrocks of the Southgate-Rock outcrop complex and the Victory-Southgate series complex. Elevations at these sites range from 101 to 378 meters (331.3 to 1,240.1 feet) at sea level.

Thomas' Lidflower was cited by Little *et al.* (1974) as "locally common on mountains at 91-244 m (300-800 feet) altitude in St. Thomas. On the island of St. John, the species occurs in a small area (approximately 1.5 acres/0.6 hectare) on Bordeaux Mountain (USFWS 1997). In Virgin Gorda, BVI, Thomas' Lidflower occurs within the Gorda Peak National Park which has an area of 236 acres (approximately 95.5 hectare) (Clubbe *et al.* 2003).

f. Other relevant information on species?

At the time of listing, little was known about the phenology, recruitment, and habitat requirements of the species. Clubbe *et al.* (2003) indicated that the Virgin Gorda population is flowering and fruiting regularly, and that a good population of seedlings had been recorded in Gorda Peak National Park. The author also mentioned that bats were observed feeding on fruits of Thomas' Lidflower. In the absence of knowledge of the phenology, pollination biology, recruitment and disperser of Thomas' Lidflower in St. John, it is difficult to predict the status of the species and its distribution.

2. Five Factor Analysis

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

When the species was listed in 1994, the Service identified habitat destruction and modification as important factors affecting the species. In St. John, the Thomas' Lindflower is found within the Virgin Island National Park, a federal land managed for conservation. At time of listing, the Service considered that the species was threatened by park management practices and the presence of feral pigs and donkeys. At present, we are not aware of information indicating that park management practices and the presence of exotics mammals in Thomas' Lidflower habitat are direct threats for the species.

On March 2011, NPS notified the Service about the intention of the Department of Public Works in USVI to improve the Bordeaux Mountain Road (Road 108), a road that goes through the Virgin Island National Park, crossing St. John from east to west. The Thomas' Lidflower population in St. John is known to occur adjacent to Road 108 within

the Virgin Island National Park (Omar Monsegur, USFWS, 2012, pers. comm.). The proposed road improvements of sections located within the Park may affect an undetermined number of Thomas' Lidflower saplings (Rafe Boulon, National Park Service 2012, pers. comm.). Presently, the USVI Department of Public Works engineers are aware about the presence of the species and the need to implement conservation measures for the species in this section of the project. In addition, the proposed project is on hold due to lack of funding. Therefore, this threat is not imminent.

Exotic mammals such as white-tailed deer (*Odocoileus virginianus*) and wild domestic mammal such as feral goats (*Capra aegagrus hircus*), pigs (*Sus scrofa*), and donkeys (*Equus asinus*) are found throughout the range of the Thomas' Lidflower on St. John and Virgin Gorda (Carlos Pacheco, USFWS, 2012, pers. obs.). Clubbe et al (2003) also mentioned loose cattle trampling through the Gorda Peak National Park may pose a threat to individuals in Virgin Gorda. It is expected that, due to their abundance, these exotic mammals are modifying the forest structure through overgrazing or altered seed dispersal mechanisms (Chakroff 2010). This may imply changes to microhabitat conditions that are necessary for seed germination and seedling recruitment of the specie. Because Thomas' Lidflower has been poorly monitored, the magnitude and imminence of this threat are not well understood. Therefore, the possible impact to the Thomas' Lidflower by exotic and wild domestic mammal remains speculative as long term monitoring is needed.

The Thomas' Lidflower population in Virgin Gorda lies within the Gorda Peak National Park. Clubbe *et al* (2003) cited that some developments are occurring close to the Park boundary that may negatively affect the species' habitat and could result in loss of mature individuals. The author also mentioned increase of visitation by hikers (locals and tourist) through the walking trails and human trampling through the Park to exploring new areas may result in losses of individuals in Virgin Gorda.

Proctor (1992) stated that although Thomas' Lidflower had not been found on St. Thomas since 1980, deforestation at the collection area for residential and tourist development may pose imminent threats to the survival of the species, if present. At this time, we do not have information on the presence of the species in St. Thomas.

Based on the above information, the Thomas' Lidflower is threatened by urban development, by road improvement, and by exotic and wild domestic mammals. Since the known populations are affected by habitat destruction or modification, we consider this factor as a threat. The magnitude of this threat is considered as high due to the low number of individuals known, but non-imminent because the known populations occur in lands managed for conservation.

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

At the time of listing, overutilization for commercial, recreational, scientific or educational purposes was not considered a threat to the species. The Thomas' Lidflower is recognized by its rarity and restricted range making it more attractive to collectors and

scientists, but based on the available information; we have no evidence that the species has been sought for such purposes. Therefore, we continue to consider that the species is not threatened by this factor.

(c) Disease or predation:

At time of listing, disease and predation was not considered as a threat to the species. Based on the best available information, we continue to consider that the species is not threatened by this factor.

(d) Inadequacy of existing regulatory mechanisms:

When the Thomas' Lidflower was listed, the inadequacy of existing regulatory mechanisms to protect the species in the Commonwealth of Puerto Rico was identified as a threat. Currently, the Commonwealth of Puerto Rico and the U.S. Virgin Islands have adopted regulations that recognize and provide protection for the Thomas' Lidflower.

Thomas' Lidflower is currently protected in USVI by the Virgin Island Code, Title 12 – Chapter 2; Protection of Indigenous, Endangered and Threatened Fish, Wildlife and Plants of the Endangered and Indigenous Species Act of 1990. The purpose of this Chapter is to protect, conserve and manage indigenous fish, wildlife and plants, and endangered or threatened species for the ultimate benefit of all Virgin Islanders, now and in the future (V.I. Code, Title 12, Chapter 2). The Section 105 of this Chapter prohibits the harassment, injury or killing, or the attempt to do the same, or sell or offer for sale any specimen, or parts or products of an endangered or threatened species.

In St. John, Thomas' Lidflower has additional protection within the Virgin Island National Park. The National Parks Omnibus Management Act of 1998 (Pub. L. 105-391, Sec. 1(a), Nov. 13, 1998, 112 Stat. 3497), Title II, "National Park System Resource Inventory and Management" giving a research mandate to the NPS to support resource management decisions (16 U.S.C. 5936). It requires the NPS to inventory and monitor its natural resources. 16 U.S.C. § 5934. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. Section 207 of the Omnibus Management Act of 1998 allows NPS to withhold from the public information related to the nature and specific location of endangered, threatened, or rare species unless disclosure would not create an unreasonable risk of harm to the species. The NPS has implemented its resource management responsibilities through its Management Policies, Section 4.4, which states that "it will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems" (NPS 2006). 16 U.S.C. § 5937. The regulatory mechanisms discussed above allow NPS to prevent collection or take of this species on their lands.

Furthermore, Thomas' Lidflower is protected by the Lacey Act even when the Service has no evidence of import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce of the species. The Lacey Act (P.L. 97-79, as amended; 16 U.S.C. 3371 et seq.) pertains to plants (in particular trees) that are illegally harvested.

There is no list of specifically prohibited plants under the Lacey Act because the Act applies to all plants, as defined in the statute. Under the Lacey Act, as amended, “Plant” means: “Any wild member of the plant kingdom, including roots, seeds, parts or product thereof, and including trees from either natural or planted forest stands.” There are some exclusions. Common cultivars (except trees) and common food crops are excluded from the definition of plant. In addition, a scientific specimen of plant genetic material that is to be used only for laboratory or field research and any plant that is to remain planted or to be planted or replanted is also excluded from the definition of plant, unless the plant is listed under the Endangered Species Act or a similar State law, or is listed in an appendix to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Prior to the recent amendments, Lacey Act protections covered only endangered plants (such as those listed on appendixes of CITES), and there were prosecutions involving the illegal harvest and associated trade of non-timber plants species such as orchids, ginseng, saguaro cacti, and others. The Lacey Act now makes it unlawful to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any plant, with some limited exceptions, taken, possessed, transported or sold in violation of the laws of the United States, a State, an Indian tribe, or any foreign law that protects plants or that regulates certain plant related offenses. It is the responsibility of the importer to be aware of any foreign laws that may pertain to their merchandise prior to its importation into the United States. Presently, the U.S. Government has not available such a database.

Although the Thomas’ Lidflower has been excluded from Puerto Rico due to misidentification, the species still has protection under the Commonwealth Law of Puerto Rico. The Commonwealth of Puerto Rico approved Law No. 241 in 1999, known as “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 as the property of Puerto Rico all wildlife species within its jurisdiction, regulate permits, hunting activities, and 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 Puerto Rico). Thomas’ Lidflower has been included in the list of protected species and designated as “critically endangered” under Regulation 6766. Article 2.06 of this regulation prohibits collecting, harassing, hunting, removing, among other activities, of listed animals within the jurisdiction of Puerto Rico. Under this article, the species’ habitat is also protected because habitat is deemed as essential to the survival of the species.

The current adequacy of existing regulatory mechanisms in the BVI needs to be determined.

Based on the presence of local and federal laws and regulations protecting the species, we believe that the inadequacy of existing regulatory mechanisms is not a threat to the Thomas’ Lidflower in Puerto Rico and USVI.

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

One of the most important factors affecting the continued existence of the Thomas' Lidflower is its limited distribution. In the Caribbean, native plant species, particularly endemics with limited distribution and highly specialized ecological requirements, may be vulnerable to natural or anthropogenic events such as hurricanes, genetic variation and climate change. The Thomas' Lidflower is more susceptible to natural disturbances such as hurricanes because it is confined to geographically small areas (USFWS 1997).

Limited distribution and highly specialized ecological requirements.

Thomas' Lidflower is vulnerable to extinction due to its limited distribution and highly specialized ecological requirements. Little is known about the phenology, natural recruitment, and habitat requirements of the species. The low number of individuals per population may suggest that the species has highly specialized ecological requirements to grow (Omar Monsegur, USFWS, 2012, pers. comm.). The low population number and restricted distribution (i.e., only 2 populations reported), coupled with habitat alteration or loss may also exacerbate its vulnerability to natural or anthropogenic events such as hurricanes, compromising the continued existence of this species (USFWS 1997). In the absence of knowledge on the natural recruitment capacity and habitat requirement of this species, it is difficult to predict its recovery after natural or anthropogenic events such as hurricanes, human induced fires and climate change, compromising the continued existence of the species.

Genetic Variation.

Given the extremely limited geographic distribution of Thomas' Lidflower, it is highly likely that its genetic variability is very low. This would result in a loss of alleles by random genetic drift, which would limit the species' ability to respond to changes in the environment (Honnay and Jacquemyn, 2007). In order to safeguard the remaining genetic diversity, the protection and monitoring of known adult individuals should be considered as a high priority for the conservation of the species. Based on the above, we consider the potential lack of genetic variation as a possible threat to the species.

Invasive Species.

The most comprehensive forest inventory of the U.S. Virgin Islands indicate that three most common plant species are the invasive exotic plants, *Leucaena leucocephala*, *Tecoma stans* and *Megathyrus maximus* (Chakaroff 2012). As mentioned under Factor A, habitat modification for road improvements may highlight the threats to the Thomas' Lidflower due to edge effect. Any disturbance on vegetation along the road may create conditions favorable for the establishment of invasive species that may outcompete with native plants species changing vegetation structure. Invasive species (e.g. *Leucaena leucocephala* and *Megathyrus maximus*) may spread and colonized the Thomas' Lidflower habitat, and it could alter fire regimes, microclimate, and nutrient cycling of the habitat that the species depend. Because we have no information about the

competitive abilities of the Thomas' Lidflower in such situation, the possible impact to the Thomas' Lidflower by invasive species remains speculative as long term monitoring is needed.

Hurricanes.

Hurricanes or tropical storms are atmospheric systems that affect the islands of the Caribbean. Hurricanes contribute to shaping vegetation and ecosystem processes, being it is a factor in determining the structure and composition of biotic communities in the Caribbean forests (Walker *et al* 1991, Lugo 2000). As a species endemic to the Lesser Antillean, the Thomas' Lidflower should be adapted to hurricanes, but its occurrence at the highest elevations of St John and Virgin Gorda, where winds may be stronger, may place it at increased risk, especially as climate change is predicted to increase the frequency and strength of hurricanes. Hurricane winds often lead to tree defoliation, loss of small and large branches, and up-rooted resulting in damage to adjacent trees and understory plants when trees or branches fall, and ultraviolet damage to leaves of understory juveniles exposed to high light levels (Brokaw and Walker 1991). Additionally, high rainfall associated with tropical storms and hurricanes, sometimes about 24 inches (2 feet) of rain in a single storm event, can cause floods and interacting with topography and geologic substrate may induce mass wasting events, e.g. land, mud and debris slides (Lugo 2000). A mass wasting event in the area where Thomas' Lidflower grows would not only take out adult plants and their young offspring, but their seed bank and substrate as well. A small landslide or felling trees may provide gaps in the vegetation that would allow other plants (native or non-native, herbaceous or woody) to become established. Due to the extremely limited range of the species, low number of individuals and lack of information about its natural recruitment and habitat requirements, we believe that stochastic events such as severe tropical storms or hurricanes may well have an adverse impact on the species.

In the absence of knowledge on the natural recruitment capacity and habitat requirement of this species, it is difficult to predict its recovery after natural events such as hurricanes and tropical storms. Therefore, since the species has only few known individuals in a limited range, we consider this threat as high in magnitude; but not imminent.

Climate change.

Changes in climate can have a variety of direct and indirect impacts on species, and can exacerbate the effects of other threats. Rather than assessing "climate change" as a single threat in and of itself, we examine the potential consequences to species and their habitats that arise from changes in environmental conditions associated with various aspects of climate change. Vulnerability to climate change impacts is a function of sensitivity to those changes, exposure to those changes, and adaptive capacity (IPCC 2007; Glick *et al.* 2011).

An expected effect of the climate change is the increase in intensity of hurricanes and tropical storm, followed by extended period of drought (IPCC 2012). This climate

change may alter (modify) the surrounding vegetation around the populations of the Thomas' Lidflower. Hurricane effects followed by extended period of drought may result in changes in soil conditions and microclimate and may allow other plants (native or non-native, herbaceous or woody) adapted to drier conditions to become established (Lugo 2000). Invasive species (e.g. *Leucaena leucocephala* and *Megathyrsus maximus*) may spread and colonize the Thomas' Lidflower habitat, and it could alter the fire regimen, microclimate, and nutrient cycling of the habitat that the species depends upon. If vegetation from lower elevation areas can invade and dominate the Thomas' Lidflower habitat this species would not be able to migrate to higher elevations because there are none. Hence, the species would no longer survive.

Due to its limited distribution and number of natural populations, we consider the cumulative effects by hurricanes, genetic variation, and exotic and invasive species (plants and animals) as detrimental to the Thomas Lidflower as a whole. The population dynamics of the species is poorly known (e.g., depressed genetic variability, lack of natural recruitment, and its competitive abilities), there are only few known populations, and there is a lack of information to determine what constitutes a viable population. Therefore, we consider the above mentioned threats as high in magnitude because the species has only few known individuals in a limited range; but not imminent because threats like climate change are not likely to occur in near future.

3. Synthesis

Thomas' Lidflower was listed as an endangered species and is currently known from only two populations; one at St. John in USVI and another at Virgin Gorda in BVI. In St. Thomas, the species has not been found since 1980, despite search efforts.

Presently, the status of the species in St. John and Virgin Gorda is uncertain. Since 2003, the information regarding the species' status, population trends, phenology, habitat requirements and the status of its habitat is limited. However, despite the little information available, we believe the species still occurs in St. John and Virgin Gorda because habitat for the plant is still present in and around the historical collection sites. Field surveys on Thomas' Lidflower should be pursued in areas where the species was traditionally found and in non-traditional sites that harbor suitable habitat for this plant in order to get a better idea of its status.

Based on our analysis, Thomas' Lidflower is currently threatened by Factor A (present or threatened destruction, modification, or curtailment of its habitat or range), and Factor E (other natural or manmade factors affecting its continued existence). Habitat modification and degradation caused by urban development like road construction threaten the Thomas' Lidflower. Hurricanes and tropical storms, and climate change are also considered as threats to this species. We consider the magnitude of Factor A and Factor E as high because of the species' limited distribution and low number of individuals known and non-imminent. Overutilization for commercial, recreational, scientific, or educational purposes, the inadequacy of existing regulatory mechanisms and disease/predation are not threats to the species.

The Endangered Species Act defines an endangered species as any species which is in danger of extinction throughout all or a significant portion of its range. Therefore, based on the information gathered during this review, we believe that Thomas' Lidflower continues to meet the definition of endangered especially because of its limited distribution.

III. RESULTS

A. Recommended Classification:

X No, no change is needed.

No change in species recovery priority number for the Thomas' Lidflower is recommended during this review.

IV. RECOMMENDATIONS FOR FUTURE ACTION

1. The status (distribution, abundance, possible threats) of Thomas' Lidflower in the U.S. and BVI should be ascertained. Mechanisms should be developed to share information on this and other Puerto Rican Bank species, and to coordinate conservation plans and activities.
2. Field surveys on Thomas' Lidflower should be conducted within historical sites and in non-traditional sites with suitable habitat to determine the existence of this species.
3. Studies should be conducted on the species' phenology and reproductive biology.
4. Studies should be conducted to determine the patterns of genetic variation, in order to develop a plan to preserve the species' germplasm.
5. Propagation and reintroduction of the species should be conducted in order to strengthen the existing population. This action should be carefully evaluated by the Service taking into consideration if the species continues to be viable, existing threats to the species, genetic variations and if we can find ways to propagate without seeds.
6. The population should be monitored on a regular basis, and additional survey visits should be made after hurricanes, landslides, or other major disturbances. The known population at St. John should be monitored on a long term basis to determine the species' trends.

7. The Service and the National Park Service should develop a plan with specific actions for the management and enhancement of existing populations within the Virgin Islands National Park.
8. As new information becomes available, when individuals are documented, and the Service works further with partners like the National Park Service, the recovery plan should be revisited and possibly revised to establish measurable criteria, including how many individuals constitute a self-sustainable population and how many populations would be needed to delist the species.

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US FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Thomas' Lidflower (*Calypttranthes thomasi*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

X No change needed

Review Conducted By: Carlos Pacheco, Caribbean Ecological Services Field Office

FIELD OFFICE APPROVAL:

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

Approve:  Date: 9/3/2013

REGIONAL OFFICE APPROVAL:

for
Lead Regional Director, U.S. Fish and Wildlife Service

Approve:  Date: 9-22-13