

Stahlia monosperma
(Cóbana negra)

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



Photo Credit: USFWS 2007

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



5-YEAR REVIEW
***Stahlia monosperma* (Cóbana negra)**

I. GENERAL INFORMATION

A. Methodology used to complete the review: On September 21, 2007, the Service published a notice in the *Federal Register* (72 FR 54061) announcing the 5-year review of (*Stahlia monosperma*) Cóbana negra and requested new information concerning the biology and status of the species. A 60-day comment period was opened. However, no information on Cóbana negra was received from the public during the comment period.

A Service biologist prepared the 5-year review that summarizes new information that the Service has gathered since the plant's listing on April 5, 1990 and the signing of the recovery plan on November 1, 1996. New information consists of unpublished field survey results, reports of research projects, peer reviewed scientific publications, unpublished field observations by the Service, State and other experienced biologists, and personal communications.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. Comments received were evaluated and incorporated as appropriate (see Appendix A).

B. Reviewers

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

Lead Field Office: Maritza Vargas/José G. Martínez, 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: September 21, 2007; 72 FR 54061.

2. Species Status: 2013: Improving. New natural populations have been reported in Guayanilla, Cabo Rojo and Lajas (Sierra Bermeja). The species is being introduced in various Commonwealth Forests, privately-owned lands under conservation status and National Wildlife Refuges (NWR) of Puerto Rico.

3. Recovery Achieved 2 (2 = 25-50 % of species recovery objectives achieved).

4. Listing History

Original Listing

FR notice: 55 FR 12790
Date listed: April 5, 1990
Entity listed: species
Classification: threatened

5. Associated rulemakings: Not Applicable.

6. Review History:

Cóbana negra was listed in 1990 as threatened (55 FR 12790). It was found in the municipalities of Cabo Rojo, Río Grande, and Vieques, with a population estimated on 380 individuals among the three localities (Figure 1; USFWS 1990). The recovery plan for the species was signed in 1996. At that time, population estimates were dropped to a little more than 110 individuals (USFWS 1996). Cóbana negra is also found in the Dominican Republic, but the number of populations and individuals on that Island is currently unknown.

A species review was conducted for Cóbana negra in 1991 (56 FR 56882). In this review, the status of various species was simultaneously evaluated with no in-depth assessment of the five factors or threats as they pertain to the individual species. The Service was seeking new or additional information reflecting the necessity of a change in the status of the species under review. The notice indicated that if significant data were available warranting a change in a species' classification, the Service would propose a rule to modify the species' status. No change in the listing classification of Cóbana negra was found to be appropriate.

The April 5, 1990, Final Rule (55 FR 12790), and the Recovery Plan for *Stahlia monosperma* (Cóbana negra), approved and signed on November 1, 1996 (USFWS 1996), are the most comprehensive analyses of the species status and are used as reference points for this 5-year review.

Every year the Service reviews the species' status and incorporates any new information in the Recovery Data Call. In the 2007, 2008 and 2013 Recovery Data Calls, we reported that the status of the species was improving. Planting has occurred in various Commonwealth Forests, NWRs and other private properties in Puerto Rico.

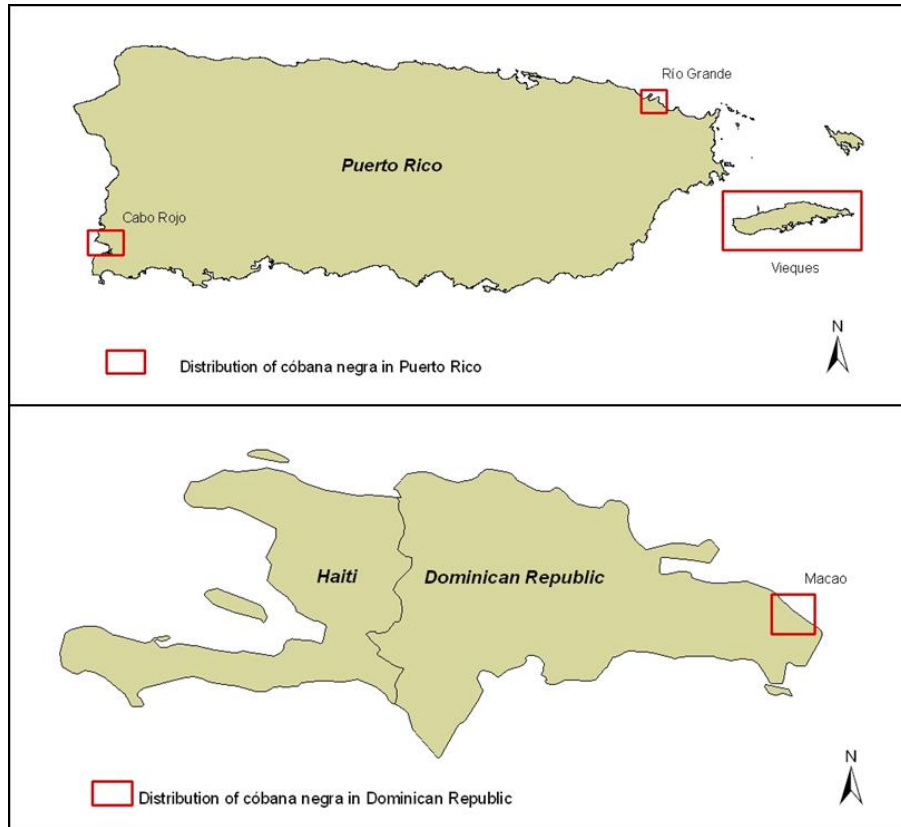


Figure 1. Known distribution of *Cóbana negra* in Puerto Rico and the Dominican Republic at the time of listing (USFWS 1996).

7. Species' Recovery Priority Number at start of review (48 FR 43098): 8. At the time of listing, *Cóbana negra* was recognized as a species with a moderate degree of threat and high recovery potential.

8. Recovery Plan:

Name of plan: Recovery Plan for *Stahlia monosperma* (*Cóbana negra*)

Date issued: November 1, 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 listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the DPS policy is not applicable to this plant species, it is not addressed further in this review.

B. Recovery Criteria

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

The species has an approved recovery plan. However, 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 nor the amount of new populations to be established in protected areas.

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 the species distribution. The knowledge on natural and introduced individuals has expanded.

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 *Cóbana negra* may be considered for delisting when:

1. Self-sustaining new populations (following the appropriate ecological and genetic studies to determine self-sustainability) are established within protected areas.
2. Specimens or populations found in privately owned lands are placed under protective status.

Criterion 1 has been initiated. Propagation efforts are being conducted in various National Wildlife Refuges and Commonwealth Forests of Puerto Rico. In addition, there are planting efforts on private lands that are designated for conservation. This criterion is considered initiated because some of the individuals planted are small trees (treelets) and have not yet reached maturity. Other introduced individuals (mature individuals) do not constitute self-sustaining populations because recruitment, dispersion and natural expansion have not been documented, either because the individuals have been planted in urban areas, pasturelands, or other areas that do not constitute suitable habitat for the species. Thus, the Service does not consider that these plantings contribute to the recovery of the *Cóbana negra*.

The Service just initiated a project under the Cooperative Recovery Initiative (CRI) in the area of Sierra Bermeja in southwest Puerto Rico with the long-term goal of addressing the threats to *Cóbana negra* and other listed plant species by enhancing their existing populations and establishing new populations within both the Laguna Cartagena National

Wildlife Refuge and adjacent private lands. We believe that by addressing the threats to the species the Service will consider proposing a delisting of *Cóbana negra* in the future.

Criterion 2 is partially met. Several populations occur on private lands with conservation status. Laguna Guaniquilla is part of a reserve managed by Para La Naturaleza, a Unit of the Puerto Rico Conservation Trust, Punta Picúa is designated as a natural reserve by the Puerto Rico Planning Board, and Punta Ventana is part of a conservation area under a Habitat Conservation Plan for the San Francisco Windfarm (SFWF), LLC project (previously known as Windmar). The *Cóbana negra* populations at Laguna Yanuel and Laguna Kiani are within the Vieques NWR, and part of the population in Sierra Bermeja is within Laguna Cartagena NWR.

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:

Cóbana negra is a medium size tree that reaches 7.6 to 15.2 m (25-50 ft) in height and 30.4 to 454.7 cm (1-1.5 ft) in trunk diameter. It belongs to a monotypic genus of the Leguminosae (Fabaceae) family and Caesalpinaceae subfamily endemic to Puerto Rico and the Dominican Republic (Little and Wadsworth 1964). *Cóbana negra* grows within the subtropical dry forest and subtropical moist forest life zones (Ewel and Whitmore 1973). The subtropical dry forest occurs along the south-southwest coast of Puerto Rico, most of Vieques Island, all of Culebra Island and the northeastern most part of Puerto Rico. Individuals grow in brackish, seasonally flooded wetlands in association with mangrove communities and along creeks.

Santiago-Valentín and Rojas-Vázquez (2000) surveyed three known natural populations of *Cóbana negra*: Laguna Yanuel in Vieques, Laguna Guaniquilla in Cabo Rojo, and Punta Picúa in Río Grande. The authors reported only 34 individuals, approximately one-third of the individuals reported in the recovery plan (Table 1). While reporting a decrease in numbers from previous reports, they also found three new individuals near the previously reported records located in Laguna Guaniquilla. The largest population was found in Laguna Yanuel with 18 individuals, followed by Punta Picúa with 11 individuals, and Laguna Guaniquilla with 5 individuals. Size classes range from <2 meters (6 feet) to >10 meters (33 feet) in height.

Santiago-Valentín and Rojas-Vázquez (2000) also surveyed other areas with suitable habitat for the species. They searched along Puerto Negro and Laguna Monte Largo in the northeast area of Vieques, and at the eastern and northeastern border of Laguna Joyuda in Cabo Rojo. However, efforts to locate *Cóbana negra* in these other areas were unsuccessful.

Table 1: Number of individuals in historical sites and size classes (height) of Cóbana negra (Santiago-Valentín and Rojas-Vázquez (2000).

Location	Number of Individuals	Size Classes (meters)
Laguna Yanuel	18	<2- 3.9
Laguna Guaniquilla	5	4-7.9
Punta Picúa	11	<2 - >10
Total	34	

Based on the information gathered for this review, close to 200 individuals of Cóbana negra with different size class are known to exist in nine natural populations (Table 2). Overall, all individuals have been poorly monitored, and currently the status of these populations is unknown. Four of these nine populations (80% of natural individuals) are located in protected areas: Punta Ventana, Vieques National Wildlife Refuge (VNWR), Punta Guaniquilla, and Punta Picúa. The population of Cóbana negra in Punta Guaniquilla is the smallest in a protected area. On the other hand, the Punta Ventana population is the largest natural population known in Puerto Rico with approximately 97 individuals of different age classes and seems to be healthy (J. Lazcano, former biologist for the WindMar project, now SFWF, pers. comm., 2009).

The populations in Cabo Rojo along Road PR 307 (Boquerón Country Club), Laguna Joyuda, Sierra Bermeja, Punta Melones, and near Villa Taina, are located on private lands. These populations consist of a small number of individuals growing sparsely. All these populations, except the population along Road PR 307, have been observed with fruits; however, no recruitment of seedlings has been documented.

The Service conducted a site visit to the population along Road PR 307 (Boquerón Country Club), where the individuals are found along a creek in the middle of a residential development project, and found that all individuals (17) are still present and alive. However, the population is enclosed by the urban development and the potential for the establishment of new individuals is limited.

Table 2. Natural populations of Cóbana negra currently known in Puerto Rico. Overall, all individuals have been poorly monitored, and the current status of these populations is unknown.

Location	Municipality	No. of individuals ^a	Land Use	Source
Road PR 307 (Boquerón Country Club)	Cabo Rojo	17	Private, Residential	Boquerón Country Club (Project file 72023-314)
Punta Ventana	Guayanilla	97	Private Conservation Area	J. Lazcano, former biologist for the WindMar project, now SFWF, pers. comm., 2009
Laguna Joyuda	Cabo Rojo	3	Private, near Natural Reserve area	Santiago-Valentín and Rojas-Vázquez (2000), O. Monsegur, USFWS, pers. comm., 2009

Sierra Bermeja	Cabo Rojo-Lajas	5	Private and Public (NWR)	C. Pacheco and O. Monsegur, USFWS, pers. comm., 2009
Vieques NWR	Vieques	40	Public (NWR)	Geo Marine Inc. 2006, USFWS 2007
Punta Guaniquilla	Cabo Rojo	5	Private Conservation Area	Santiago-Valentín and Rojas-Vázquez (2000)
Punta Picúa	Río Grande	11	Private	Santiago-Valentín and Rojas-Vázquez (2000)
Punta Melones	Cabo Rojo	8	Private, Residential	Bahía Campomar (Project 72023-420), Monte Carlo Resort (72023-023), C. Pacheco, USFWS, pers. comm., 2009
Near Villa Taina	Cabo Rojo	5	Private	C. Pacheco, USFWS, pers. comm., 2009
Total Number of individuals		191		

^a The number of individuals per population represents an estimate, and may include seedlings and saplings. The numbers of individuals came from different sources and were collected using different standards.

The Puerto Rico Department of Natural and Environmental Resources (PRDNER) has been propagating *Cóbana negra* for more than a decade at the nursery in the Cambalache Commonwealth Forest. *Cóbana negra* is one of the numerous listed species that PRDNER is propagating and reintroducing into different Commonwealth Forests, NWRs and Reserves. Other governmental and non-governmental organizations have also propagated *Cóbana negra*, including the University of Puerto Rico and the Puerto Rico Conservation Trust. The PRDNER has provided plants to the Caribbean Islands NWR Complex for reforestation within refuge lands. The PRDNER also provides *Cóbana negra* individuals to other Service’s programs such as Partners for Fish and Wildlife and the Coastal Program to be planted on private lands that have wildlife cooperative extension agreements, conservation easements, or other conservation mechanisms. The main purpose of these reforestation efforts is to enhance wildlife habitats in Puerto Rico and the U.S. Virgin Islands. Examples of these reforestation projects include: planting of 26 individuals of *Cóbana negra* in a property managed by Puerto Rico Conservation Trust, located near the natural populations of Guaniquilla in Cabo Rojo, and the planting of several individuals in the Altamira farm, a private property adjacent to the Cabo Rojo NWR. Overall, planted individuals have been poorly monitored, and their current status is unknown.

Based on the information available in our records, more than 2,000 individuals of *Cóbana negra* were planted during the last decade (Table 3). However, some of these populations cannot be considered as self-sustaining either because trees still too young or there have been no reports of recruitment or natural expansion. Other trees of *Cóbana negra* were planted on private and public land (i.e., pasturelands, farms, parks, and along roads) where they are maintained pruned regularly, and thus, are unable to recruit.

On January 2014, Service biologist José Martínez conducted a rapid assessment on one section of the Cóbana negra population planted at Laguna Cartagena NWR. A total of 42 healthy individuals of Cóbana negra were documented during the assessment. Approximately 20 adults had natural recruitment near the parental tree (USFWS 2014). However, it is unknown if these seedlings or saplings are developing into adult reproductive individuals or if they are being outcompeted by other predominant vegetation.

The Service is currently working on the CRI project for the implementation of recovery actions for the Cóbana negra species (i.e., propagation and planting, habitat enhancement with native species, cattle exclusion, fire breaks, enhancement and restoration on private lands, surveying and monitoring natural populations and outreach). These actions will help enhancing the Cóbana negra existing populations and establishing new populations within the southwestern area of Puerto Rico. The goals of these actions are to safeguard the genetic diversity, and to help recover the species for its possible proposed delisting.

Table 3: Cóbana negra localities and number of individuals planted in Puerto Rico (CF = Commonwealth Forest, CR = Commonwealth Refuge, NWR = National Wildlife Refuge).

Location	Municipality	No. of individuals^a	Land ownership	Source
Finca Gabia	Santa Isabel	400	Public	J. Casanova, PRDNER, pers. comm., 2009
Toa Vaca Lake	Juana Díaz	200	Public	J. Casanova, PRDNER, pers. comm., 2009
Guánica CF	Guánica	15	Public	C. Pacheco, USFWS, pers. comm., 2009
Cambalache CF	Arecibo	50	Public	J. Canabal, PRDNER, pers. comm., 2009
Piñones CF	Loíza	10	Public	V. Rodríguez, PRDNER, pers. comm., 2009
Guilarte CF	Adjuntas, Guayanilla, Peñuelas, Yauco	Data not available	Public	D. Torres, PRDNER, pers. comm., 2009
Susúa CF	Sabana Grande, Yauco	20	Public	V. Rodríguez, PRDNER, pers. comm., 2009
Boquerón CF	Cabo Rojo	14	Public	W. Morales, PRDNER, pers. comm., 2009
Boquerón CR	Cabo Rojo	5	Public	J.L. Carlo, PRDNER, pers. comm., 2009
Vega CF	Vega Alta	50	Public	J. Laureano, PRDNER, pers. comm., 1989
Julia de Burgos Park-AAA Plant near Piñones	Loiza	200 shared between the two areas	Private	V. Rodríguez, PRDNER, pers. comm., 2009
Playa Higuillar	Dorado	unknown	Private	V. Rodríguez, PRDNER, pers. comm., 2009
Palmas del	Humacao	unknown	Private	V. Rodríguez, PRDNER, pers. comm.,

Mar				2009
University of Puerto Rico, Humacao Campus	Humacao	250	Public	Raul A. Perez, Professor UPR-Humacao, 2005 (letter)
Cabo Rojo NWR	Cabo Rojo	448	Public	Weaver, P.L. and J. J. Schwagerl 2008,
Laguna Cartagena NWR	Lajas	380	Public	Weaver, P.L. and J. J. Schwagerl 2008, O. Diaz, USFWS, pers. comm., 2007
Along Road PR-116	Lajas	22	Public	C. Pacheco, USFWS, pers. comm., 2009
Along Road PR- 303	Cabo Rojo, Lajas	4	Public	C. Pacheco, USFWS, pers. comm., 2009
Along Roads PR-102, PR-117, PR-320	Lajas, Sabana Grande	76	Public	Santiago-Valentin and Rojas-Vazquez, 2000
Punta Guaniquilla-Puerto Rico Conservation Trust	Cabo Rojo	26	Private (conservation)	C. Pacheco, USFWS, pers. comm., 2009
Private Lot in Culebra	Culebra	10	Private	C. Pacheco, USFWS, pers. comm., 2009
Guánica Communal Center	Guanica	6	Public	C. Pacheco, USFWS, pers. comm., 2009
Private lot near Boquerón Forest	Cabo Rojo	5	Private	C. Pacheco, USFWS, pers. comm., 2009
University of Puerto Rico-Magueyes Island	Lajas	unknown	Public	J. Vivaldi, PRDNER, 1989 (letter)
University of Puerto Rico-Cayey Campus	Cayey	20	Public	O. Monsegur, USFWS, pers. comm., 2012
University of Puerto Rico-Mayagüez Campus	Mayagüez	20	Public	Internet site: http://web.me.com/jamarimutt.arbolesrum/indexareaingl.html ; O. Monsegur, USFWS, pers. comm., 2009
Altamira Farm	Cabo Rojo	25	Private	PRDNER and Partners for Fish and Wildlife Project (wildlife cooperative extension agreement)
Total Number of individuals		2,256		

^a The number of individuals per population represents an estimate, and may include seedlings and saplings. The numbers of individuals came from different sources and were collected using different standards.

In 1996, the Department of Botany of the Dr. Rafael M. Moscoso National Botanical Garden in the Dominican Republic conducted a survey to determine the status of *Cóbana negra* in Dominican Republic. They found a population of 100 individuals in Macao, Higüey, Provincia La Altagracia, which is the largest population of *Cóbana negra* documented in Dominican Republic (Table 4; Mejía et. al. 1997). Nonetheless, the National Botanical Garden has successfully reproduced the species and have restored two populations to their natural state in San Pedro de Macoris (Figure 2; Mejía et. al. 1997).

Table 4: Known populations in Dominican Republic.

Locality	# of individuals	Coordinates	Source
Macao - Provincia La Altagracia	100	18°46'N, 68°34'W	Mejía et. al. 1997, T.A. Zanoni and M. M. Mejía 1989
San Pedro de Macoris	Number not specified	18°26.5'N 69°16'W	Mejía et. al. 1997, T.A. Zanoni and M. M. Mejía 1989



Figure 2. Current locations of *Cóbana negra* in Dominican Republic.

b. Genetics, genetic variation, or trends in genetic variation:

The *Cóbana negra* seeds used for reforestation projects have come from only a few trees, accentuating a genetic bottleneck and probably a reduced genetic variation of the species. A study performed by Brian Dunphy (University of Georgia, pers. comm. 2002, in Center for Plant Conservation; http://www.centerforplantconservation.org/collection/cpc_view_profile.asp?CPCNum=4087), found that the amount of allozyme diversity observed is extremely low for a flowering plant and is consistent with a severe reduction in population size in the recent past (i.e., a population bottleneck).

c. Taxonomic classification or changes in nomenclature:

There is no new information regarding taxonomic classification or changes in nomenclature of *Cóbana negra*.

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

The final listing rule and the recovery plan described the natural distribution of *Cóbana negra* as limited and only included populations from Cabo Rojo, Río Grande and Vieques Island. However, further surveys and studies have found a wider distribution of the species. At present, natural populations of *Cóbana negra* are found in nine areas: Punta Ventana, Punta Guaniquilla, Laguna Joyuda, Punta Melones, Road PR 307 (Boquerón Country Club), near Villa Taina, Sierra Bermeja, Punta Picúa, and Vieques Island (Table 2). Additionally, based on a propagation effort conducted for more than 13 years, the species has been planted at least 18 municipalities throughout Puerto Rico (Figure 3). This information does not include those individuals that have been planted as part of reforestation efforts and public education, and those that have been planted island-wide around public parks, and along state and rural roads and private parcels.

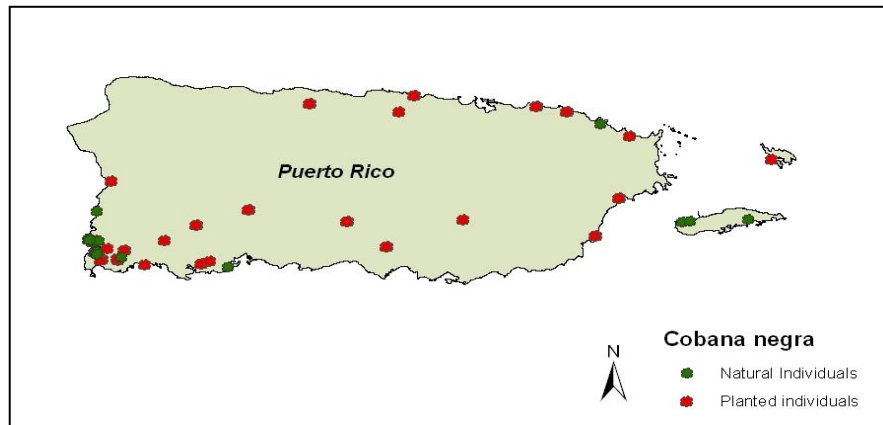


Figure 3. Natural and introduced populations of *Cóbana negra* in Puerto Rico.

e. Habitat:

In general, *Cóbana negra* grows in brackish, seasonally flooded wetlands along creeks and drainages, and in coastal plains. The species can tolerate high concentrations of salt (e.g., saltpeter (potassium nitrate) beds and land adjacent to mangrove communities). Predominant associate species are bottonwood mangrove (*Conocarpus erectus*), white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*), *Annona glabra*, *Pterocarpus officinalis*, *Acrostichum aureum*, almacigo (*Bursera simaruba*,) and

úcar (*Bucida burceras*) (Santiago-Valentín and Rojas-Vazquez 2000, Monsegur, USFWS, pers. comm., 2009).

In the Dominican Republic, Cóbana negra is known to grow in brackish, seasonally-flooded wetlands sometimes associated with mangroves and close to river mouths in low elevation areas. Associated species are *Guaiacum* spp. and *Bucida* spp. (Mejía et.al. 1997).

f. Other relevant information:

Santiago-Valentín and Rojas-Vázquez (2000) found records of planting of Cóbana negra since the 1920s, including a report by botanist N.L. Britton of a reforestation that included a planting of 12,000 individuals of Cóbana negra along the south coast of Puerto Rico. This information establishes uncertainty about the legitimacy of the known natural localities along the south coast of Puerto Rico. No other specific information was found on original stocks or the sites where seeds, seedlings, or saplings used for planting were obtained.

A study conducted by Brenda Cadiz Rivera from the University of Puerto Rico, Humacao Campus, evaluated the germination of Cóbana negra under different conditions. The scarification method resulted in a faster rate of seed germination (approximately 11 days) than seed germination in a natural environment (approximately 47 days) (Prof. Raúl A. Perez-Rivera, UPR-Humacao Campus, pers. comm., 2005).

2. Five Factor Analysis

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

In the final rule, destruction and modification of Cóbana negra's habitat was identified by the Service as the most significant factor affecting the species.

Santiago-Valentín and Rojas (2000) mentioned that areas such as Punta Picúa, Laguna Guaniquilla, and Laguna Joyuda are under enormous pressure for development. Although these areas are designated natural reserves by the PRDNER, the coastal areas adjacent to these reserves are privately-owned and are urbanized with residential and tourist projects. The development of these areas has resulted in habitat modification and fragmentation, and has limited the natural expansion of currently known populations of Cóbana negra. Furthermore, some of the wetland areas are commonly used as illegal dumping sites where used tires, mattresses, refrigerators, and other kind of trash are left in suitable areas for the species. These illegal actions affect the growth and health of Cóbana negra individuals.

During the last decade, the Service has recommended revisions to the plans for numerous development projects in coastal areas where suitable habitat for Cóbana negra is present. Additionally, the Service has evaluated projects with potential adverse effects on

individuals of *Cóbana negra*, particularly in coastal areas in the municipalities of Cabo Rojo and Río Grande. These areas include: Punta Melones (with the projects Bahía Campomar and Monte Carlo Resort), Punta Picúa, near Villa Taina, Laguna Joyuda, and private farms in Sierra Bermeja. These areas are of high value for the construction of second homes, hotels, villas, mega-resorts and associated infrastructure.

As part of the technical assistance and Section 7 consultation processes with local and Federal agencies for developmental projects, the Service recommends conservation measures to minimize possible adverse effects of projects on listed species and their habitat. For example, we provided comments to the U.S. Army Corps of Engineers for the residential project known as Boquerón Country Club along Road PR 307 in Cabo Rojo. A population consisting of about 17 adult trees was proposed to be affected by the construction of a road crossing structure associated with the project. The Service recommended avoiding impacts to the population, and the landowner followed our recommendations. However, the population of *Cóbana negra* is located in the middle of the residential project. Although a buffer zone was provided immediately adjacent to the population, the habitat is limited by development and these conditions are not suitable for natural expansion and dispersal of the population. Despite direct impacts to this population were avoided, the habitat modification and the development of the adjacent areas pose a barrier that may affect the natural expansion of the population and may also interfere with the connectivity with populations in nearby areas.

Based on the information gathered during this review, *Cóbana negra* is currently threatened by habitat modification and fragmentation associated with urban development.

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

Based on anecdotal information, the wood of *Cóbana negra* was highly valued for fence posts and furniture. This historic demand may have contributed to the reduction in numbers of the individuals of *Cóbana negra*. After listing the species, there have been no reports indicating these practices are a threat to known populations. In the Dominican Republic, they also believed that the species was in peril because of the overexploitation (for train rails and furniture uses).

We are not aware of any utilization of *Cóbana negra* for commercial, recreational or scientific purposes. Thus, we do not consider this to be a threat to the species.

(c) Disease or predation;

At the time of listing, browsing of seedlings was considered a threat to the species especially in the first year following establishment.

Currently, Sierra Bermeja, Villa Taina and Laguna Joyuda, are areas where livestock may still graze on *Cóbana negra*. The individuals in grazing areas grow sparse and only reach adulthood where cattle are limited.

Because most of the wild individuals are in protected areas restricted from livestock, and some have conservation measures for the protection of the species, we believe that the threat of predation is low.

The Service is not aware of any disease that may threaten *Cóbana negra*. However, natural populations of this species are comprised mostly of relic individuals and the propagated material has historically been collected from the same seed sources. Thus, as preliminary studies suggest (Dunphy, B. University of Georgia, pers. comm. 2002, in Center for Plant Conservation;

http://www.centerforplantconservation.org/collection/cpc_viewprofile.asp?CPCNum=4087), the species may be affected by low genetic diversity, which can make

Cóbana negra vulnerable to insect pests or pathogens. However, the Service has no evidence of any insect pest or pathogen currently affecting the species.

(d) Inadequacy of existing regulatory mechanisms:

When the Final Rule to list *Cóbana negra* was published, the species was not included in the Commonwealth's list of protected species. In 1999, the Commonwealth of Puerto Rico approved the 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). *Cóbana negra* was listed as threatened in this Regulation. Article 2.06 of Regulation 6766 prohibits collecting, cutting, removing, among other activities, listed plant individuals within the jurisdiction of Puerto Rico.

In addition, the PRDNER included Punta Picúa as part of the Espiritu Santo Natural Reserve, and Laguna Joyuda as part of the Laguna Joyuda Natural Reserve, also considered a Critical Wildlife Area (CWA; PRDNER 2005). The CWA designation does not protect the species from the legal perspective, but acknowledges the importance of designated CWAs as important habitat resources in Puerto Rico and associated islands. It also acknowledges the intention to protect and preserve the resources from degradation due to incompatible land use *in situ* or adjacent to the areas (PRDNER 2005).

As for the *Cóbana negra* population at the Vieques NWR, one of the refuge's objectives is to maintain rare local subtropical dry forest habitat and wetlands ecosystem for resident and migratory birds and rare and endangered species. Furthermore, the deposit of fill material on wetland areas is regulated by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

The *Cóbana negra* population in Punta Ventana is located within a designated conservation area included in a Habitat Conservation Plan, as amended, for the San

Fransisco Wind Farm project (Guarnaccia 2005). The Punta Guaniquilla area is a reserve protected and managed by Puerto Rico Conservation Trust.

Suitable habitat of *Cóbana negra* certainly extends to private properties not managed for conservation. Thus, the enforcement of laws and regulations on these lands continues to be a challenge as accidental damage or extirpation of individuals has occurred with other federally listed species due to lack of knowledge of the species by private landowners and law enforcement officers. However, at this time we are unaware of any damage occurring to *Cóbana negra* on private properties. Furthermore, through the CRI project the Service will continue working with partners and private landowners and continue monitor for damage to individuals or removal. Therefore, based on the presence of Commonwealth and Federal laws and regulations protecting these species, and the protection of populations within private conservation lands, we believe that the inadequacy of existing regulatory mechanisms should no longer be considered a threat to *Cóbana negra*.

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

Lack of natural recruitment

The *Cóbana negra* populations have been affected by lack of natural recruitment despite the abundant fruit production and the fact that seeds germinate very well under nursery conditions. The best information available indicates that little recruitment is occurring on natural populations, and when present, seedlings and saplings are located just below the parent tree, suggesting problems of seed dispersal. Due to the lack of long term monitoring efforts, it remains unknown if these individuals will develop as mature plants capable of reproduction. Thus, the Service is unable to determine if the natural populations are actually stable or improving.

In the case of reintroduced material, a rapid assessment conducted by the Service on individuals planted since 1998 at Laguna Cartagena NWR, identified several size classes, which suggests some recruitment (USFWS 2014a). However, a thorough assessment of the entire population at Laguna Cartagena is needed to determine if natural recruitment is actually occurring. Also, other reintroduced individuals have been planted in private and public lands, which are not suitable natural habitats for the species (e.g. pasturelands and urban areas). Hence, we do not consider these plantings self-sustaining and the chances for these populations to be expanding are very limited. Therefore, we believe that the factors mentioned above are a threat to the species.

Hurricanes and Climate change

Disturbances such as hurricanes may affect small relic populations of *Cóbana negra*. These populations are very important as they may harbor an important genetic stock of the species. *Cóbana negra* may be further threatened by climate change, which is predicted to increase the frequency and strength of tropical storms and can cause severe droughts (Hopkinson et al. 2008). Even if *Cóbana negra* resists adverse effects of

hurricanes, the cumulative effects of severe storms, soil erosion and increased sediment runoff may compromise the establishment of seedlings along drainages, which usually provide suitable habitat for the species. Habitat modification may result in irreversible damage to the species' natural habitat, decreasing the number of individuals in already small populations. However, the current frequency of severe hurricanes is low, therefore, the Service considers severe tropical storms as a low and non-imminent threat to the species.

Human-induced fires

Caribbean ecosystems are vulnerable to natural and anthropogenic events. Native plants and endemic species with limited distribution are particularly susceptible to human-induced fires. Restoring native plant communities is challenging where invasive plants have altered fire regimes and ecosystem properties (Brooks et al. 2004). In Puerto Rico, the native plant community of subtropical dry forests is not fire-adapted; hence, it has been affected by human induced fires (Wolfe 2008). These fires may lead to destruction of the native vegetation seed bank, and usually favor conditions for the establishment of exotic plant species (e.g., *Leucaena leucocephala* and *Megathyrsus maximus*). Moreover, exotic plants increase direct competition for resources and limit native plant species recruitment in highly degraded areas (Wolfe 2008). The possibility of severe droughts triggered by climate change may contribute to an increase in the number and frequency of fires on Puerto Rico. These cumulative factors may reduce the number of individuals and further reduce populations of Cóbana negra. The Service is aware of natural populations of Cóbana negra being directly affected by human induced fires and the associated habitat modification in the area of Sierra Bermeja (USFWS 2014b). Moreover, areas managed for conservation, and where the species have been widely planted, have been recently affected by fires (i.e., Cabo Rojo NWR and Laguna Cartagena NWR). Nonetheless, we consider the threat of human-induced fires to be low and non-imminent because their effect is local and they do not threaten all populations of Cóbana negra at once.

Genetic variation

Cóbana negra occurs in small natural populations with a limited geographic distribution. These factors along with habitat fragmentation, and the fact that planted individuals come from propagated material from the same seed source, may result in the erosion of genetic variation of the species (Honnay and Jacquemyn 2007). Such genetic erosion also may limit the species' ability to respond to environmental changes (Booy et al. 2000). As previously mentioned under the section about new genetic information, Cóbana negra may be facing a population bottleneck due to a severe reduction in population size in the recent past. Based on the above information, we consider the low genetic variation as a high, but non-imminent threat to the species.

3. Synthesis

Stahlia monosperma or Cóbana negra is a federally-listed threatened species that belongs to a monotypic genus of the family Fabaceae, endemic to Puerto Rico and Dominican

Republic. According to the information gathered for this 5-year review, the status of the species is improving. At present, we have knowledge of more naturally occurring populations than previously reported when the species was listed, and the number of individuals in the wild has also increased.

Currently, there are nine natural known populations located sparsely around Cabo Rojo, Lajas, Guayanilla, Río Grande and Vieques Island. Introduced individuals may be found at least 18 municipalities around the island of Puerto Rico and in three areas in the Dominican Republic (Macao, Higüey, and San Pedro de Macoris).

The recovery criteria establish that delisting of *Cóbana negra* could be considered when: (1) self-sustaining new populations (following the appropriate ecological and genetic studies to determine self-sustainability) are established within protected areas, and (2) specimens or populations found on privately-owned lands are placed under protective status. Criteria 1 has been initiated with the introduction of individuals in protected areas. Criteria 2 has been partially met as most natural individuals (80%) are in areas managed for conservation by governmental and non-governmental organizations.

Based on the information gathered for this review, we believe that *Cóbana negra* is still threatened by habitat modification and natural factors such as lack of genetic variation, and natural recruitment, along with other factors such as hurricanes, landslides, and introduction of exotic species.

III. RESULTS

A. Recommended Classification:

 X No, no change is needed.

B. New Recovery Priority Number: 8c

Cóbana negra remains subject to a moderate degree of habitat destruction mainly due to tourism and residential development, and human-induced fires. Nonetheless, the species' recovery potential continues to be high because management needs have been documented and the introduction of individuals in protected areas has high probability of success. The species is in conflict with development growth (expansion may be limited or may be completely disrupted), consequently the conflict category 'c' has been added to the recovery priority number.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

- The Service, in cooperation with PRDNER and academia, needs to determine how many individuals constitute a self-sustaining population. After this work, the recovery plan should be revised to establish objective, measurable delisting criteria.

- Genetic studies should be conducted to determine the genetic variation of planted individuals.
- Efforts to protect privately-owned populations should be started. Areas like Punta Melones, near Villa Taina, Laguna Joyuda and Sierra Bermeja are susceptible to development. Hence, working with the private landowners to conserve these natural areas is essential. Private-lands initiatives such as Partners for Fish and Wildlife and Coastal Programs are needed to further protect the areas where *Cóbana negra* is known to occur naturally.
- The Service should continue the efforts to promote the collection of seed material from natural populations and not from plantations. This actions help to increase the genetic variation of *Cóbana negra*.
- Conduct periodic surveys of introduced populations to assess the success of planting efforts and determine if recovery actions are effective.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Stahlia monosperma* (Cóbana negra)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review:

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

Review Conducted By: José G. Martínez, Caribbean Ecological Services Field Office, Boquerón, Puerto Rico

FIELD OFFICE APPROVAL

Approve *Paulin Pi* Date Oct 8, 2014

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

for

REGIONAL OFFICE APPROVAL:

Approve *Aaron L. Valde* Date 10-29-14

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

Appendix A. Summary of peer review for the 5-year review of *Stahlia monosperma* (Cóbana negra)

A. Peer Review Method: We sent the draft 5 year review of *Stahlia monosperma* to knowledgeable individuals and requested their peer review to the document, particularly any additional information on the status and the current threats of the species. Only two peer reviewers responded the request.

List of Peer Reviewers

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

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

Christian W. Torres Santana
Arboretum Parque Doña Inés
Fundación Luis Muñoz Marín
RR 2, Buzón #5
San Juan, PR 00926-9766
Phone: 787 755-7979 ext. 30
E-mail: ctorres@flmm.org

Eduardo Cintrón
Department of Natural and Environmental Resources
P.O. Box 9066600
San Juan, Puerto Rico 00940
Phone: 787-759-1373
E-mail: ecintron@drna.gobierno.pr

Ernesto L. Díaz
Department of Natural and Environmental Resources
P.O. Box 9066600
San Juan, Puerto Rico 00940
Phone: 787-759-1373
E-mail: ediaz@drna.gobierno.pr

Oscar Díaz
Cabo Rojo and Laguna Cartagena National Wildlife Refuges
P.O. Box 510
Boquerón, PR 00622
Phone 787-851-7258
E-mail: oscar_diaz@fws.gov

Mike Barandarian
Vieques National Wildlife Refuge
Road 200, KM 0.04
Vieques, PR 00765
Phone: 787.741.2138
E-mail: mike_barandarian@fws.gov

B. Summary of Peer Review Comments/Report: Peer reviewer responses were supportive of the information and assessment presented in this review. Mike Barandarian provided us information with historic information of one adult individual of Cóbana negra located north-east of La Chiva lagoon on the east tract of Vieques NWR (CH2MHILL U.S. Navy).

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