

STAHLIA MONOSPERMA (COBANA NEGRA)
RECOVERY PLAN

prepared by

Jorge E. Saliva
U.S. Fish and Wildlife Service
Caribbean Field Office
Boquerón, Puerto Rico

for the

U.S. Department of the Interior
Fish and Wildlife Service
Southeast Region
Atlanta, Georgia



Approved:

Noreen K. Clough
Noreen K. Clough, Regional Director, Southeast Region
U.S. Fish and Wildlife Service

Date:

November 1, 1996

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By approving this recovery plan, the Regional Director certifies that the data used in its development represent the best scientific and commercial information available at the time it was written. Copies of all documents reviewed in the development of the plan are available in the administrative record, located at the Boquerón, Puerto Rico, Field Office.

Literature Citation:

U.S. Fish and Wildlife Service. 1995. *Stahlia monosperma* (cóbana negra) Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 15 pp.

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EXECUTIVE SUMMARY OF THE RECOVERY PLAN FOR
STAHLIA MONOSPERMA (COBANA NEGRA)

Current Status: *Stahlia monosperma* (cóbana negra) is a tree currently known from parts of the southwestern and northeastern coasts of Puerto Rico and the island of Vieques. Approximately 95 individual trees are known from six locations. It is listed as threatened.

Habitat Requirements and Limiting Factors: Cóbana negra usually grows in brackish, seasonally flooded wetlands in association with mangrove communities. The only wild populations in Puerto Rico are known from Cabo Rojo, Río Grande, and Vieques island. Coastal development and cattle grazing threaten the remnant populations of this species. This tree has been used for fence posts in cattle farms.

Recovery Objective: Delisting.

Recovery Criteria: To ensure a self-sustaining population of *Stahlia monosperma*, existing populations and their habitats should be protected. Populations must be re-established in areas within the historical range of the species, and additional propagated individuals should be introduced in protected areas (e.g., Commonwealth natural reserves) suitable for the successful establishment of new populations. Genetic studies must determine that current populations have sufficient genetic variability.

Actions Needed:

1. Monitor existing populations.
2. Provide protection, through acquisition or conservation easements, for existing populations on private lands.
3. Develop management plans for the species where it occurs on Federal or Commonwealth land.
4. Evaluate the necessity and feasibility of propagation.
5. If determined to be necessary and feasible, conduct propagation and enhance existing populations or establish new ones.

Date of Recovery: Delisting should be initiated in 2015, if recovery criteria are met.

Recovery Costs: Recovery costs for *Stahlia monosperma* have been estimated to be \$194,000 for the first 3 years. Costs for land acquisition have not been estimated, since alternative mechanisms may be utilized to protect the species. Subsequent expenditures will depend upon the results of these preliminary studies and, therefore, cannot be estimated at this time.

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PART I. INTRODUCTION

Stahlia monosperma belongs to a monotypic Genus endemic to Puerto Rico and Hispaniola, and it usually grows in brackish, seasonally flooded wetlands in association with mangrove communities. The only wild populations in Puerto Rico are known from Cabo Rojo, Río Grande, and Vieques Island. Coastal development threatens the remnant populations of this species.

Stahlia monosperma was determined to be a threatened species on April 5, 1990 (U.S. Fish and Wildlife Service 1990). Critical habitat was not designated for this species because the number of individuals of *S. monosperma* is sufficiently small that vandalism (cutting of trees for fear of Federal action involving the protection of individual trees), and overcollection (to use for fence posts and charcoal) could seriously affect the survival of the species.

Description

Stahlia monosperma (cóbana negra) is a medium-sized, evergreen tree that reaches 25 to 50 feet in height, and 1 to 1.5 feet in diameter. It is a member of the Family Fabaceae, easily identified by (1) pinnately compound leaves with 6 to 12 opposite, lance-shaped to ovate leaflets on red stalks and with scattered black raised dots on lower surface; (2) clusters of pale yellow flowers about one-half of an inch across the five petals; (3) odd, elliptic, thick and fleshy, red pods 2 inches or less in length; and (4) yellow-green and slightly pendulous foliage (Little and Wadsworth 1964).

Flowers are yellow and are produced between March and May, depending on rainfall. Flower clusters are terminal, 3 to 6 inches long, and unbranched. The slightly hairy flowers have a funnel-shape, broad base, 10 stamens and a one-celled, slender and curved ovary. A thin, red, fleshy fruit is produced during late June and mid-July. Fruit pods are about 1.5 inches broad and three-fourths of an inch thick, with an odor of ripe apples, light brown tasteless flesh, and one large seed (Little and Wadsworth 1964). Fruits mature in summer and fall. The sapwood is light brown, and the heartwood is dark brown. The wood is very hard, heavy, strong, durable, and resistant to attack by dry wood termites.

Reproductive Biology

Healthy *Stahlia monosperma* trees generally produce abundant flowers and fruits, although not necessarily every year. Although seeds may be dispersed by water during the wet season, they also appear to be dispersed by animals because fruits are colorful, fragrant, and with an edible pulp. Possible native dispersal animals include fruit-eating bats or some other extinct mammalian species. Land crabs (*Cardisoma* spp.) are abundant in *S. monosperma* habitat and may take fruits into their burrows to remove the pulp without destroying the seeds, providing burial for the seeds. Seeds apparently germinate after burial and when surface water has receded. Most seedlings, however, seem to be short-lived in the wild, and in areas that are accessible to cattle they may be either trampled or browsed within 1 year of establishment.

Distribution and Population Status

Scattered populations of *Stahlia monosperma* survive in Puerto Rico, Vieques, and the eastern portion of the Dominican Republic (near Macao). The largest population (about 23 trees and 35 seedlings) was known from the southwestern coast of Puerto Rico near Boquerón (Densmore 1987). A group of up to 50 individuals was found in the brackish lagoons of Vieques, and several mature trees were observed in Río Grande (U.S. Fish and Wildlife Service 1990). The status of these populations is uncertain, and some individuals have not been found recently.

S. monosperma is highly valued for fenceposts (Densmore 1987), and the species may have been greatly reduced in numbers by the cutting of smaller size classes for such purposes. The remaining trees may represent those which were not straight enough to be of use. More recently, suitable sized trees have vanished with the absence of adequate reproduction due to the effects of cattle (Densmore 1987). Grazing or browsing have virtually prevented any reproduction, since the lands outside the mangrove areas were converted to from sugar cane to pasture.

Habitat Description

Wild *Stahlia monosperma* grows in brackish, seasonally flooded wetlands in association with mangrove communities, although cultivated plants have been reported from inland areas such as the nursery at Cambalache State Forest in Puerto Rico. Its associates are usually "úcar" (*Bucida buceras*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). Individuals are also found on pasture lands adjacent to mangrove forests, as well as in some urban areas of Boquerón.

Nearly all of the known trees are growing at the edge of salt flats or shallow lagoons which are inundated during the wet season. More extensive flooding may periodically immerse their root systems in brackish water. Although wild *S. monosperma* trees are usually found adjacent to stands of black mangrove, they are limited to drier, slightly elevated microsites not occupied by mangrove species. Planted trees appear to tolerate a wide variety of soil and moisture conditions, although full sunlight seems to be necessary for vigorous growth of trees and seedlings in all situations (Densmore 1987).

Reasons for Listing

Stahlia monosperma has probably declined in response to the severe degradation of Puerto Rico's wetlands over the last two centuries. Clearing, woodcutting, intensive agriculture, overgrazing, and the resulting erosion of uplands into coastal lowlands, have contributed to this decline (Densmore 1987). Only a few widely scattered groups of *S. monosperma* remain in Puerto Rico, mostly in areas threatened by cattle grazing and coastal development.

Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing encourages and results in conservation actions by Federal, Commonwealth, and private agencies, groups, and individuals. The Endangered Species Act provides for land acquisition and cooperation with the Commonwealth, and requires that recovery actions be carried out for all listed species.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as threatened or endangered. Section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species. If a Federal action may affect a listed species, the responsible Federal agency must enter into formal consultation with the Service. Federal involvement relates to the Army Corps of Engineers regulatory program in areas under jurisdiction of Section 404 of the Clean Water Act, as well as international actions taken by the Corps relative to U.S. Navy property.

Since *S. monosperma* does not appear to be limited by natural factors (i.e., it reproduces readily when protected from grazing), the number of trees could be increased by supplemental plantings in areas protected from livestock, and by erecting exclosures around existing trees. Suitable areas within the Commonwealth forests or on Conservation Trust lands would be appropriate sites for such work. Cattle are clearly the single limiting factor to this species' continued existence in the Boquerón area.

PART II. RECOVERY

A. Recovery Objective

The objective of this recovery plan is to provide direction for reversing the decline of populations of *Stahlia monosperma*, and to restore the species to a self-sustaining status, thereby permitting its removal from the Federal Endangered Species List.

This species 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.

B. Narrative Outline

1. Prevent further loss of individuals. Protection of habitat and individuals of *Stahlia monosperma* at known sites should be initiated.
 11. Protect existing populations and individuals. Highest priority should be given to the protection of existing populations, given the low number of remaining individuals of *S. monosperma* in the wild.
 111. Protect from cattle grazing. Measures to eliminate the threat of cattle grazing on seedlings and adults of *Stahlia monosperma* should be developed and discussed with landowners who have this species in their properties.
 112. Enforce existing Commonwealth and Federal endangered species regulations. The Puerto Rico Department of Natural and Environmental Resources' Regulation to Govern the Management of Threatened and Endangered Species in Puerto Rico provides for criminal penalties for the illegal take of listed plant species on public lands. In addition, development projects which occur in these areas are often funded through local or Federal agencies, or require local permits. Section 10 of the regulation provides for consultations on listed species that may be affected by a particular project, similar to Section 7 of the Endangered Species Act of 1973, as amended. Section 7 consultation would be necessary for Federal actions that may affect listed species.

12. Obtain protective status for the privately-owned population sites. Privately-owned sites should be protected through land acquisition, the establishment of conservation easements, or through landowner agreements.
13. Monitor populations. Individual plants and the recruitment of new individuals at all sites must be monitored on a long-term basis. Basic field observations on population biology (including phenology, seed production, and dispersal), recruitment success, site changes, and growth, should be conducted.
2. Continue artificial propagation and refine current propagation program. Improvements to the current artificial propagation program need to be considered in light of the small population numbers and isolated location of individuals. Current propagation programs need to be evaluated to improve and increase the production of viable seedlings. Appropriate individuals and agencies with experience in artificial propagation and the successful transplanting of propagated material should be consulted.
3. Enhance existing populations and establish new populations. A working group (e.g., government agencies, universities, non-profit organizations, private citizens) should be formed to discuss the feasibility and methodology to establish new populations and enhance the existing populations of *Stahlia monosperma*.
 31. Identify areas for the establishment of new populations. Potential sites for the introduction of propagated seedlings should be evaluated, taking into consideration the habitat requirements of the species to ensure the success of transplanted propagated material.
 32. Enhance existing populations. Appropriate measures to enhance existing populations should be developed that prevent the degradation of the habitat already occupied by the species.
 33. Monitor transplanted seedlings. Seedling growth and survival should be monitored to determine success of introduction and evaluate the methodology for transplanting propagated seedlings.
4. Conduct research. Studies of population biology, ecology, and genetics of *Stahlia monosperma* are needed to obtain a better understanding of this species' requirements, and to develop sound management techniques to enhance its populations.
 41. Study the reproductive biology and ecology. Studies are needed to determine why all trees of *Stahlia monosperma* do not flower and produce fruits every year. Bats and crabs have been identified as potential seed dispersers, however, such

suggestions need to be confirmed, and pollinators need to be identified. Field observations to determine pollinators of this species, as well as seed dispersers need to be conducted.

42. Evaluate seed viability, longevity, and germination requirements. Studies indicate that seeds are not very viable in the field, although they propagate readily in laboratory conditions. Further observations on germination in both the laboratory and the field should be made.
43. Evaluate requirements for seedling establishment and growth. Studies need to be conducted to determine the necessary conditions (e.g., soil characteristics, temperature, salinity) for the healthy development and maturation of seedlings.
44. Conduct studies of population genetics. Population genetic studies need to be conducted by means of electrophoresis and/or morphometric analysis of leaves to determine genetic variability in *Stahlia monosperma*, given that only small, isolated populations and individuals exist.
5. Provide information to the public on *Stahlia monosperma*. Private landowners, project consultants, and permitting and funding agencies should receive information on *Stahlia monosperma*, and the laws and responsibilities that protect this species. The general public should be made aware of the potential economical, ecological, and aesthetic importance of preserving and enhancing populations of *Stahlia monosperma*.
6. Refine recovery goals. As additional information on the biology, ecology, propagation, and management of *Stahlia monosperma* is gathered, it may be necessary to redefine, and possibly modify, recovery goals.
61. Determine the number of individuals and populations necessary to ensure species stability, security, and self-perpetuation. Environmental and reproductive studies, together with the relative success of population protection measures, will allow more realistic recovery goals to be established.
62. Determine what additional actions, if any, are necessary to achieve recovery objectives. Incorporate into the plan any actions not included in this recovery plan that, during the recovery process, become recognized as species' needs.

C. Literature Cited

Densmore, R. 1987. Status report on *Stahlia monosperma* (cóbana negra) in southwestern Puerto Rico. Unpublished report submitted to the Caribbean Field Office, U.S. Fish and Wildlife Service, Boquerón, Puerto Rico .

Department of the Interior. U.S. Fish and Wildlife Service. April 5, 1990. Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for *Stahlia monosperma* (cóbana negra). *Federal Register* 55(66):12790-12792.

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PART III. IMPLEMENTATION SCHEDULE

Priorities in Column 1 of the following Implementation Schedule are assigned as follows:

Priority 1: An action that must be taken to prevent extinction, or to prevent the species from declining irreversibly in the foreseeable future.

Priority 2: An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.

Priority 3: All other actions necessary to provide for full recovery of the species.

List of Abbreviations:

ES = U.S. Fish and Wildlife Service, Ecological Services

LE = U.S. Fish and Wildlife Service, Division of Law Enforcement

PRDNER = Puerto Rico Department of Natural and Environmental Resources

GROUP = Conservation Organizations

OWNER = Private Landowner

NAVY = U.S. Navy

UNIV = Universities and Schools

IMPLEMENTATION SCHEDULE

PRIORITY #	TASK #	TASK DESCRIPTION	TASK DURATION (YRS)	RESPONSIBLE PARTY			COST ESTIMATE (\$K)			COMMENTS
				FWS Region	FWS Program	Other	FY1	FY2	FY3	
1	111	Protect from cattle grazing.	10	4	ES, LE	OWNER	None			
1	112	Enforce existing Commonwealth and Federal endangered species regulations.	Cont.	4	LE	PRDNER	12	12	12	
1	12	Obtain protective status for privately-owned sites.	4	4	ES	PRDNER GROUP OWNER NAVY	None	4	4	
2	13	Monitor populations.	4	4	ES	PRDNER	7	5	5	
2	2	Continue artificial propagation.	6	4	ES	PRDNER	2	3	3	
2	31	Identify areas to establish new populations.	4	4	ES	PRDNER	7	5	5	
2	33	Monitor transplanted seedlings.	4	4	ES	PRDNER	7	5	5	

IMPLEMENTATION SCHEDULE (continued)

PRIORITY	TASK #	TASK DESCRIPTION	TASK DURATION (YRS)	RESPONSIBLE PARTY			COST ESTIMATE (\$K)			COMMENTS
				FWS Region	FWS Program	Other	FY1	FY2	FY3	
2	41	Study periodicity of flowering pollination, fruit set and seed dispersal.	10	4	ES	PRDNER	10	5	5	
2	42	Evaluate seed viability, longevity, and germination requirements.	10	4	ES	PRDNER	10	5	5	
2	43	Evaluate requirements for seedling growth and establishment.	10	4	ES	PRDNER	10	5	5	
2	44	Conduct studies of population genetics.	5	4	ES	UNIV	20			
2	5	Public education.	4	4	ES	PRDNER UNIV	5	5	5	

IMPLEMENTATION SCHEDULE (continued)

PRIORITY	TASK #	TASK DESCRIPTION	TASK DURATION (YRS)	RESPONSIBLE PARTY			COST ESTIMATE (\$K)			COMMENTS
				FWS Region	FWS Program	Other	FY1	FY2	FY3	
2	61	Determine the individuals and population number necessary to ensure species stability, security, and self perpetuation.	5	4	ES	PRDNER	4	4	4	
2	62	Determine what additional actions, if any, are necessary to achieve recovery objectives.	5	4	ES	PRDNER	2	2	2	

IV. LIST OF REVIEWERS

Mr. Francisco Javier Blanco
Executive Director
Fideicomiso de Conservación de Puerto Rico
P.O. Box 4747
San Juan, Puerto Rico 00902-4747

Dr. Gary J. Breckon*
University of Puerto Rico
Mayagüez Campus
Department of Biology
College Station 5000
Mayagüez, Puerto Rico 00681-5000

Ms. Norma Burgos
Puerto Rico Planning Board
P.O. Box 41119
San Juan, Puerto Rico 00940

Mr. José R. Caballero-Mercado, Vice-president
Puerto Rico Planning Board
Centro Gubernamental Minillas, Edificio Norte
P.O. Box 41119
San Juan, Puerto Rico 00940-1119

Mr. Nelson J. Castellanos
Federal Highway Administration
Federal Building Room 329
Carlos Chardón Street
Hato Rey, Puerto Rico 00918

Mr. José L. Chabert, Chief
Terrestrial Ecology Division
Department of Natural and Environmental Resources
P.O. Box 5887
Puerta de Tierra, Puerto Rico 00906

Ms. Suzzete Delgado-Mendoza
Servicios Científicos y Técnicos
Condominio El Centro I
Oficina 607
Hato Rey, Puerto Rico 00918

Ms. Ileana Echegoyen
Farmer's Home Administration
G.P.O. Box 6106-G
San Juan, Puerto Rico 00906

Mr. Francisco J. Ferrer
Sociedad de Historia Natural de Puerto Rico
Apartado 361036
San Juan, Puerto Rico 00936

Lt. Col. Chester Fowler
Deputy District Engineer
U.S. Army Corps of Engineers
400 Fernández Juncos Avenue
San Juan, Puerto Rico 00906

Mr. Steven Gisler
Oregon Department of Agriculture
Natural Resources Division
635 Capitol Street, NE.
Salem, Oregon 97310-0110

Mr. Edgardo González
Forest Service Area
Department of Natural and Environmental Resources
P.O. Box 5887
Puerta de Tierra, Puerto Rico 00906

Dr. Duane A. Kolterman*
University of Puerto Rico
Mayagüez Campus
Department of Biology
College Station 5000
Mayagüez, Puerto Rico 00681-5000

Dr. Ariel Lugo*
U.S. Forest Service
Institute of Tropical Forestry
Call Box 25000, Experimental Station
Río Piedras, Puerto Rico 00925

Mr. John Mane
U.S. Coast Guard
Civil Engineering Division
909 SE First Avenue, Room 651
Miami, Florida 33131

Mr. Vicente Quevedo
Natural Heritage Division
Department of Natural and Environmental Resources
P.O. Box 5887
Puerta de Tierra, Puerto Rico 00906

Mr. Héctor Russé-Martínez
Environmental Quality Board
P.O. Box 11488
Santurce, Puerto Rico 00907

Mr. Fred C. Schmidt, Head
Documents Department-KW
The Libraries
Colorado State University
Fort Collins, Colorado 80523-1019

Mr. Carl A. Soderberg, Director
U.S. Environmental Protection Agency
Caribbean Field Office
Centro Europa Building, Suite 417
1492 Ponce de León Avenue, Stop 22
Santurce, Puerto Rico 00909

Dr. Richard Thomas
University of Puerto Rico
Río Piedras Campus
Department of Biology
P.O. Box 23360
San Juan, Puerto Rico 00931-3360

Ms. Ana María Vera
Puerto Rico Conservation Foundation
Calle O'Neill Number 11
Hato Rey, Puerto Rico 00918

Ms. Rosa Villalonga
Housing and Urban Development
159 Carlos Chardón Avenue
Hato Rey, Puerto Rico 00918-1804

*Independent Peer Reviewers