

RECOVERY PLAN FOR
THE MONA BOA
(EPICRATES MONENSIS MONENSIS)

Prepared by

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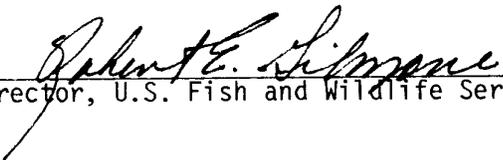
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DISCLAIMER

This is the completed Mona Boa Recovery Plan. It has been approved by the U.S. Fish and Wildlife Service. It does not necessarily represent official positions or approvals of cooperating agencies, and it does not necessarily represent the views of all individuals who played the key role in preparing this plan. This plan is subject to modification as dictated by new findings and changes in species status and completion of tasks described in the plan. Goals and objectives will be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints.

LITERATURE CITATIONS SHOULD READ AS FOLLOWS:

U.S. Fish and Wildlife Service. 1984. Mona Boa Recovery Plan.
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I. INTRODUCTION

Description and Distribution

The Mona boa, Epicrates monensis monensis, is a nonvenomous snake that grows to about one meter in length. Only twelve specimens are known to have been collected (Campbell 1978, Perez-Rivera and Valez 1978, Rivero et al. 1982). All but one were juveniles measuring from 300 mm to 1010 mm total length (TL). The single adult measured 1039 mm (TL) (Rivero et al. 1982).

The ground color of the mature individual is light brown dorsally, with 44 dark brown markings. The underside is beige with a few scattered spots (Rivero et al. 1982). On immature individuals the upper surface ground color is a very light yellowish brown with dark brownish markings. The dorsal pattern of the body consists of two rows of spots that extend to the end of the tail. The spots vary in number from 51 to 57 (Stejneger 1904). Scale counts, as reported by various authors, are as follows: around the body, 40-46; ventral, 259-267; and sub-caudals, 79-82.

The Mona boa belongs to the family Boidae of the Suborder Serpentes. The genus Epicrates is distributed throughout Central America, northern South America, and the Greater Antilles. Epicrates monensis, described from Mona Island by Zenneck in 1898, was thought to be endemic to that island. However, E. inornatus granti, described by Stull (1933) from Tortola, was transferred to E. monensis by Sheplan and Schwartz (1974). Thus, the taxon from Mona now is considered as an endemic subspecies, E. monensis monensis Zenneck.

Mona Island is a 5500 ha. rocky limestone island located midway between Puerto Rico and Hispaniola (lat. 18° 5'N, long. 67° 53'W) in

the Greater Antilles. Mean annual temperature is 30.7 C and mean annual rainfall is 800 mm.

It is characterized by a very flat plateau, a gently sloping upland surface that is terminated by high sheer cliffs along its northern and southern perimeter and by somewhat lower, less steep cliffs that descend to coastal lowlands along its western, southwestern, and southeastern margin (Aaron 1974).

Large parts of the Mona Plateau are covered by outcrops of solid limestone, dominated by a dry and semideciduous scrub vegetation of low trees and shrubs, interspersed with cacti. On the eastern side of the plateau, where salt spray exposure is greatest, organ-pipe cacti become locally dominant, forming a cactus forest 3-4 m tall. Over the rest of the plateau, a thin and discontinuous soil layer permits tree growth only on cracks, crevices and soil pockets. As a result the tree canopy is low (4-5 m) and the forest is discontinuous. Dominant species include Bursera simaruba (gumbo-limbo), Coccoloba microstachya (uverille), Ficus citrifolia (wild fig), Tabebuia heterophylla (West Indian white cedar), and Metopium toxiferum (poison tree). Between trees, the plant cover is composed largely of shrubs 1-2 m high. Dominant species include Reynosia uncinata, Croton discolor, C. humilis, Plumeria obtusa, and Antirhea acutata.

In large plateau sinkholes and depressions, and along the southwestern coastal terrace, deeper soils support more mesic, closed canopy forest. Dominant trees include Krugiodendron ferreum, Bumelia obovata, Ficus citrifolia, Clusia rosea, Chlorophora tinctoria, Mastichodendrum foetidissimum, Pisonia albida, and Dipholis salicifolia. Subcanopy

trees include Capparis cynophallophora, C. flexuosa, Myrcianthes fragrans, Schaefferia frutescens, and on the coast, Gymnanthes lucida.

Large areas of the coastal terrace were cleared and planted with West Indian mahogany (Swietenia mahogani) and Australian pine (Casuarina equisetifolia) by the Civilian Conservation Corps in the late 1930's and 1940's.

Feeding Habits

Little is known of the Mona boa's feeding habits. Schmidt (1928) reported a tail of Anolis cristatellus (= A. monensis) in an analysis of stomach contents. Observations on three specimens in captivity (Perez-Rivera and Valez 1978, Campbell 1978, Rivero et al. 1982) confirmed that Epicrates monensis consumed offered Anolis spp.. This information suggests that anoles may constitute an important part of the Mona boa's diet. Rats, mice, and bats may be included in their diet, as they are important components of the diet of other Epicrates species, like E. inornatus from Puerto Rico and E. angulifer from Cuba.

Habitat

Campbell (1978) reported that a specimen was captured on a small branch in a sub-tropical dry deciduous forest, with an open canopy. Other specimens have been observed on the southwestern coastal plain on branches of the Australian pine (Casuarina equisetifolia). Rivero et al. (1982) reported the capture of a specimen on spiny shrubs on the coastal road to Uvero. These sightings suggest a broad distribution throughout Mona Island. However, information concerning its preferred microhabitat is not available.

Reproduction

Little is known about the reproductive biology of the Mona boa. Members of the genus Epicrates usually have 8 to 30 young, born alive. Rivero (1978) reported an E. inornatus with 32 embryos. The only data available on E. monensis are those of Rivero et al. (1982). They reported that an adult specimen collected in 1979 aborted 4 young while in captivity.

Status of the Species

The Mona boa has always been considered very rare and of low occurrence in collections. It has been inferred that habitat modification by introduced goats and predation by cats and pigs are the main cause of threat (Federal Register 2/3/78). However, this presumption is highly speculative in view of its low capture rate and lack of field data.

From a sample of eight cat stomachs, Wiewandt (1977) reported the occurrence of remains of Ameiva, Anolis, Mabuya, and some invertebrates. Only one sample had remains of Alsophis, a snake with a preference for terrestrial habits. Research is needed to determine the possible causes of decline.

Perez-Rivera and Velez (1978) have suggested that the Mona boa, being nocturnal, may be difficult to locate during the daytime. That most of the specimens collected were immature individuals also suggests that as the snakes grow older their habits may make them more difficult to collect. These nocturnal, secretive habits, coupled with the spiny vegetation of Mona Island, have reduced and hindered research activities, perhaps producing a false image of rareness and endangerment (J. Rivero, pers. comm.).

History of Research

Epicrates monensis was first collected on Mona Island by Bock in 1894. Meerwarth (1901) and Amaral (1929) suggested that it was conspecific with E. fordi of Hispaniola. However, Stejneger (1904) and Stull (1933) rejected their arguments.

In 1904 Stejneger redescribed Bock's specimens in his work The Herpetology of Porto Rico. In 1932 Grant collected three juveniles similar to those described by Stejneger. From 1932 to 1973 there were many unsuccessful attempts to collect specimens and the species was considered extinct (i.e. Rivero 1978).

The chance collection of one specimen in 1973 by a visitor to Mona Island resulted in a re-evaluation of the status of the species. Unfortunately, the specimen was destroyed accidentally (Perez-Rivera and Velez 1978). One adult was collected in 1979 by a visitor who kept it as a pet. This boa was recovered later by R. Joglar, studied for a while under captive conditions, and subsequently returned to Mona Island. Notes on behavior, feeding and reproduction were taken and later published by Rivero, Joglar and Vazquez (1982).

Causes of Decline

Past and present population levels and trends are not known, thus whether or not the species is or has been reduced in numbers is an open question. If numbers have declined, the most probable cause would be the introduction of mammals, such as goats, pigs, and cats. Goats and pigs have modified many of the Island's plant communities by overbrowsing and up-rooting the vegetation. Cats are feral throughout the island and perhaps prey on boas. Wiewandt (1977) examined the

stomach contents of eight feral cats from Mona Island and found mostly bird parts and reptiles, especially Ameiva alboguttata. One sample included Anolis and another included Alsophis sp., another Mona snake. This data suggests that cats may compete for food and/or be a predator of the boa.

A decrease of the bat population has been considered as another possible cause of decline of the Mona boa population. Mona Island was mined for guano deposits (phosphates) from 1877 to 1921. Available bat roosting sites were reduced, causing a reduction of the bat population. Since other Epicrates species feed on bats, this decline could have reduced available food resources of the Mona boa. However, future field work could prove this assertion to be wrong.

Conservation Efforts

There have been no direct conservation efforts to protect the Mona boa. The Department of Natural Resources has managed the island since 1973, protecting its wildlife and vegetation. From 1973 to 1976 one resident biologist was assigned to the Island, improving the enforcement of Commonwealth laws and the protection of Mona's unique species. In 1977 the Department of Natural Resources created the Ranger Corps. Five to seven rangers, together with a resident biologist, are now residing on the Island. In addition to law enforcement, they educate visitors on the importance of the native wildlife and flora of Mona Island.

Trapping of feral cats has been carried out since 1978. However, trapping has proved a difficult task because non-target species, especially hermit crabs, tend to spring the traps. Sporadic cropping of goats and pigs is done by DNR personnel.

The Mona boa was designated as a threatened species throughout its range in 1978 (Federal Register 2/3/78) and Mona Island was declared its critical habitat.

II. RECOVERY

A. Recovery Objective

The objective of the recovery plan is to bring the population of the Mona boa to levels where it can be delisted from threatened. The lack of basic data on past and present population levels and trends precludes the formulation of a quantitative recovery level. Interaction with feral mammals should be studied. If proved to be a hazard, populations of feral mammals threatening the Mona boa should be effectively controlled, or exterminated if feasible. Therefore, it is suggested that recovery be defined in terms of a) a stable or growing population of the Mona boa during a five to ten year period and b) the effective control or eradication of feral mammals determined to be a threat to the Mona boa.

B. Step-down Outline

1. Determine the status of the present population
 - 1.1 Survey the existing population to determine density and distribution.
 - 1.2 Perform periodic surveys to determine population trends
2. Conduct natural history studies
 - 2.1 Determine habitat requirements
 - 2.2 Characterize its feeding ecology
 - 2.3 Characterize its movements and behavior
3. Determine and control threats from introduced mammals
 - 3.1 Determine effect of goats and pigs on the boa's habitat
 - 3.2 Determine if predation by cats or pigs exists
 - 3.3 Control or eradicate feral mammals if necessary and feasible

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4. Continue protection of the present population by enforcing current regulations in Mona Island.

C. Narrative

1., 1.1, 1.2, Information on population density and trends is not available for the species. This information is needed to assess the status of the population. Development of survey techniques and long-term monitoring should be carried out to determine if the population is stable, growing, or declining. In the absence of better data, a growing or perhaps a stable population, could be used as one of the criteria to qualify the species for delisting.

2. A complete study on the natural history of the Mona boa should be conducted. This information, coupled with that obtained in task 1 (above) will aid in making sound decisions concerning the actual status, management needs and final delisting of the species.

2.1 The characterization of the habitat preferred by the species will yield target areas for the study of feeding and breeding habits, as well as for the study of alterations by introduced mammals.

2.2 The study of the feeding habits may prove crucial for the determination of possible causes of decline. Anoles are an important food item for the Mona boa and feral cats. Competition for food should be assessed.

2.3 Movements within its range should be determined (use of radio telemetry is recommended). Analysis of these movements perhaps can be correlated with either dispersal behavior or food availability.

3. Introduced mammals are known to have a negative effect on at least some of Mona's plants and animals. Their effect on the boa needs evaluation.

3.1 The interaction between introduced mammals and the boa should be studied closely. The impact caused by goats and pigs on the preferred habitat of the boas should be assessed.

3.2 Predation by cats on boas or their food should be assessed (see 2.2, above). Pigs may also be potential predator, as they have been observed to eat snakes in other areas.

3.3 If necessary, populations of feral mammals should be effectively controlled, or eradicated if feasible. These populations also are considered a threat to the threatened Mona iguana (Cyclura stejnegeri) and the endangered yellow-shouldered blackbird (Agelaius xanthomus).

However, it should be noted that if eradication of cats, pigs, and/or goats is considered as a prerequisite to consider the Mona boa as recovered, recovery and delisting may never be achieved. Eradication of feral mammals has proven successful in some areas (e.g. New Zealand) but difficult if not impossible in others (e.g. in Hawaii). The vegetation, climate, and topography prevalent in Mona Island make the eradication of feral mammals an exceptionally difficult task. Strong opposition to the eradication of pigs and goats is to be expected from hunters.

4. Enforcement work and associated visitor orientation should be continued at the present level, which reflects the needs of all species and activities on the island.

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Part III Implementation Schedule

Mona Boa

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agency			Estimated Fiscal Year Costs			Comments/Notes	
					FWS Region	Program	Other	FY 1	FY 2	FY 3		
R1	Survey the existing population	1.1	1	3Yr	4	Research*	DNR		70,000	60,000	60,000	Should be conducted under one general study. Therefore, estimated yearly expenditures are reflected as one total cost. (1.1; 2.1-2.3; 3.1 & 3.2)
R1	Perform periodic surveys to determine population trends	1.2	2	Cont	4	Research*	DNR		25,000	15,000	15,000	*Asterisks indicate primary funding source, either present or anticipated.
R3	Determine habitat requirements	2.1	1	3Yr	4	Research	DNR		-	-	-	
R-14	Characterize its feeding ecology	2.2	2	3Yr	4	Research	DNR		-	-	-	
R-14	Characterize its movements and behavior	2.3	3	3Yr	4	Research	DNR		-	-	-	
R-9	Determine effect of goats and pigs on the boa's habitat	3.1	1	3Yr	4	Research	DNR		-	-	-	
R-9	Determine if predation by cats or pigs exists.	3.2	1	3Yr	4	Research	DNR		-	-	-	
M-4	Control or eradicate feral mammals	3.3	2	Cont	4	FA/SE*	DNR		30,000	30,000	30,000	
0-2	Continue protection of the present population by enforcing current regulations in Mona Island	4	1	Ongoing	4	FA/SE	DNR*		175,000	175,000	175,000	Enforcement estimates cover all Mona Is. activities.

KEY TO IMPLEMENTATION SCHEDULE COLUMNS 1 & 4

General Category (Column 1):

Information Gathering - I or R (research)

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

Acquisition - A

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

Other - O

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

Management - M

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

Priority (Column 4):

- 1 - Those actions absolutely necessary to prevent extinction of the species.
- 2 - Those actions necessary to maintain the species' current population status.
- 3 - All other actions necessary to provide for full recovery of the species.

IV. APPENDIX

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