

DIET CHARACTERIZATION OF THE INVASIVE *BOA CONSTRICTOR* IN PUERTO RICO

Maldonado-Irizarry, Génesis; Morales-Vélez, Natalia M.; Ortíz-Echevarría, Andrea N.; Soto-Colón, Isaí Y.; Soto-Vázquez, Yixel M.; Puente-Rolón, Alberto R., PhD. University of Puerto Rico, Mayagüez; Department of Biology, Mayagüez, Puerto Rico.



ABSTRACT

The Boa Constrictor (*Boa Constrictor*) is an invasive species that comes from other places to Puerto Rico. Thus, causing a negative impact on the biodiversity as well as the inhabitants of Puerto Rico. *B. Constrictor* is a widely distributed, large-bodied generalist, feeding on diverse types of prey items including mammals, birds and reptiles (Bakkegard, K., Timm, R., 2001). It has been noted that a relationship exists between prey items and predatory size. The purpose of this research is to examine diet patterns of adults and subadults of the species as well as understand the variations in prey items. All snakes used in this research were provided by the Department of Natural and Environmental Resources of Puerto Rico and were euthanized. Each snake was subjected to necropsy in order to collect data for the size and identification of what was eaten. A total of 845 snakes were examined. In concluding the recollection of data, it was determined that the most prominent species found in the intestines was *Rattus norvegicus* or *Mus musculus* (48.7% sub adults & 48.0% adults). The second most prominent species being unknown bird prey items (10.2 % sub adults y 8.3 % adults). It was found that while subadults feed on smaller prey such as *Rattus norvegicus* or *Mus musculus*; adults feed on larger prey such as *Iguana iguana*.

INTRODUCTION

The Red tail Boa (*Boa constrictor*) is a generalist and opportunistic predator which is originally from Central and South America but introduced in Puerto Rico. Previous climate matching exercises based on conditions in the extensive native range of this species suggest that *B. constrictor* represents a high establishment risk to large areas of the globe, including all Puerto Rico (Reynolds et al., 2013). This species prey on a wide taxonomic diversity from shrimp, fish, and lizards to deer, ocelots, and monkeys (Quick, J. S. et al. 2005). Previous studies documented *Boa constrictor* as predator for amphibians and reptiles and documented the process of ingesting a common iguana (*I. iguana*) (Ribeiro et al., 2018). Shine (1991) have discussed a relationship between prey and predator size, larger snakes consume larger prey due to limitations of this predator to capture small prey. Here, we will determine the diet of *B. constrictor*, as a novel invasion on the island. Also, we compare the diet of adults and sub adults to determine if there is prey segregation on the species.

OBJECTIVES

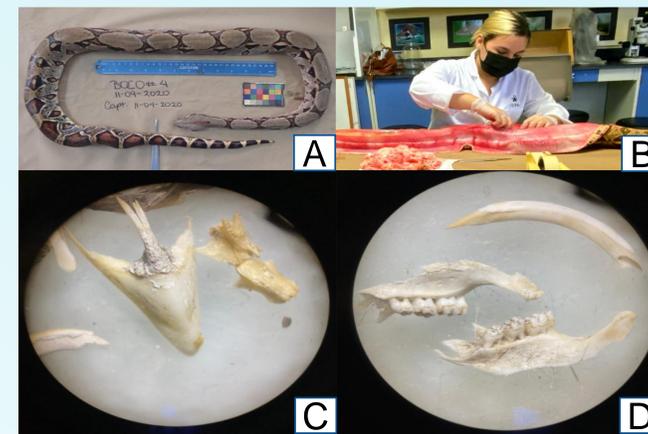
- Characterize the prey items that are being consumed by the novel invasive species *Boa constrictor* in Puerto Rico.
- Determine if there is a difference in the diet between adults and sub-adults in the *Boa constrictor* population in Puerto Rico.

METHODOLOGY

About the *Boa constrictor*: This snake has laterally directed eyes, and a single narrow dark stripe on the top of the head. Their dorsal patterns consist in dark hourglass-shaped brown or black dorsal saddles on a lighter brown background. This snake gets to adulthood when it reaches 120cm in females and in males 90cm.

In this investigation: We examined 845 *Boa constrictors* that were from the years 2011, 2012, 2013, 2014, 2018, 2019, and 2020. We receive the snakes from the Department of Natural and Environmental Resources. All captured snakes were euthanized, and they are maintained frozen until they can be examined.

Data collection: Data on size, mass and circumference were documented prior dissections. We examined the stomach and gut. All prey items were extracted, examined in a stereoscope and classified to the lowest taxonomic level.



RESULTS

Table 1. Diet of *Boa Constrictor* in subadults and adults species in

Prey	2011		2012		2013		2014		2018		2019		2020	
	Adult n %	Subadult n %	Adult n %	Subadult n %	Adult n %	Subadult n %	Adult n %	Subadult n %	Adult n %	Subadult n %	Adult n %	Subadult n %	Adult n %	Subadult n %
Mammals														
<i>Rattus norvegicus</i> or <i>Mus musculus</i>	13 30.23	2 66.67	72 57.14	13 48.15	58 54.21	6 42.86	46 54.12	5 55.56	46 43.40	4 26.66	85 53.46	11 52.38	167 43.04	50 51.02
<i>Felis catus</i>	0 0 0 0	0 0 0 0	1 0.79	0 0 0	1 0.93	0 0 0	0 0 0 0 0	0 0 0 0 0	1 0.94	0 0 0	1 0.63	0 0 0	1 0.26	0 0 0
Herpestidae	1 2.33	0 0 0	1 0.79	0 0 0	1 0.93	0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
Unidentified mammal	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	1 0.93	0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	1 0.26	0 0 0
Birds														
<i>Gallus gallus domesticus</i>	0 0 0 0 0	0 0 0 0 0	3 2.38	0 0 0	4 3.74	0 0 0	3 3.53	0 0 0	8 7.55	0 0 0	5 3.14	0 0 0	30 7.73	0 0 0
<i>Nymphicus hollandicus</i>	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 1 7.14	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
Unidentified bird	4 9.30	0 0 0	7 5.56	2 7.41	8 7.48	3 21.43	5 5.88	1 11.11	10 9.43	1 6.67	6 3.77	2 9.52	44 11.34	10 10.20
Reptiles														
<i>Iguana iguana</i>	0 0 0 0 0	0 0 0 0 0	3 2.38	0 0 0	2 1.87	0 0 0	0 0 0 0 0	0 0 0 0 0	1 0.94	1 6.67	5 3.14	0 0 0	20 5.15	0 0 0
<i>Pholidoscelis exsul</i>	0 0 0 0 0	0 0 0 0 0	0 0 0 1 3.70	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	3 3.53	0 0 0	0 0 0 0 0	0 0 0 0 0	1 0.63	0 0 0	3 0.77	0 0 0
<i>Borinkenophis portoricensis</i>	0 0 0 0 0	0 0 0 0 0	0 0 0 1 3.70	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	
Unidentified reptile	2 4.65	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	4 2.52	0 0 0	12 3.09	3 3.06
Other														
Eggs	0 0 0 0 0	0 0 0 0 0	1 0.79	0 0 0	1 0.93	0 0 0	0 0 0 0 0	0 0 0 0 0	3 2.83	0 0 0	4 2.52	0 0 0	3 0.77	0 0 0
Seeds	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0	2 1.89	0 0 0	2 1.26	1 4.76	4 1.03	1 1.02
Unknown	9 20.93	0 0 0	7 5.56	0 0 0	3 2.80	0 0 0	3 3.53	0 0 0	0 0 0 0 0	0 0 0 0 0	3 1.89	0 0 0	0 0 0 0 0	
Empty	14 32.56	1 33.33	31 24.60	10 37.04	28 26.17	4 28.57	25 29.41	3 33.33	35 33.02	9 60.00	43 27.04	7 33.33	102 26.29	34 34.69
Total	43 100	3 100	126 100	27 100	107 100	14 100	85 100	9 100	106 100	15 100	159 100	21 100	388 100	98 100



Figure 1. Diet Sample of prey item in *Boa Constrictor* (*Mus musculus* and *Gallus gallus domesticus*).



Figure 2. Diet Sample of prey item in *Boa Constrictor* (*Felis catus*).



Figure 3. Diet Sample of prey item in *Boa Constrictor* (chicken eggs).

DISCUSSION AND CONCLUSIONS

Based on the data collected shown in Table 1, the prey item most consumed by the entire species is *Rattus norvegicus* or *Mus musculus* (48.7% subadults and 48.0% adults). The second most consumed by both were bird species (unidentified) (10.2% subadults and 8.3% adults). Subadults consumed more *Rattus norvegicus* or *Mus musculus* and unidentified birds than adults. Adults consumed more *Iguana iguana* than sub-adults (0.5% sub-adults and 3.1% Adults). Overall, adults have a greater diversity of prey compared to subadults. There is no segregation of diet between adults and sub-adults.

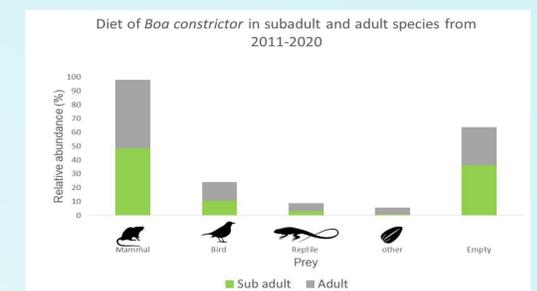


Figure 4. Graphical representation of the relative abundance of prey items in the diet of *Boa Constrictor* in subadults and adults species in Puerto Rico 2011-2020.

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