CROCODILE SPECIALIST GROUP – CSG/IUCN/SSC

Student Research Assistance Scheme (SRAS)

Final Report

Population structure of Broad-snouted caiman (*Caiman latirostris*) in Rio Doce State Park, Brazil.

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1. REPORT PRESENTATION

This report presents the main results from the study "Population structure of Broad-snouted caiman (*Caiman latirostris*) in Rio Doce State Park, Brazil" that received Student Research Assistance Scheme (SRAS) from the Crocodile Specialist Group (CSG/IUCN /SSC). This is an ongoing project that will be the monography of André Martins to receive the title of bachelor in Biological Science for the Federal University of Juiz de Fora, Brazil.

2. INTRODUCTION

The broad-snouted caiman (*Caiman latirostris*), is a médium size crocodilian 2m, although adult males can reach 3.5 m, while females are smaller and rarely reach 2m in total length (Brazaitis, 1973; Verdade and Piña, 2006). The species presents a geographic distribution restricted to the east of South America, in the north of Argentina and Uruguay, east of Brazil and south of Bolivia and Paraguay (Verdade and Piña, 2006). Moreover, *C. latirostris* is the Brazilian crocodilian that presents wider distribution (Verdade, 1998). The species can be found in mangroves, lakes, swamps and wetlands, in habitats associated with small rivers that drain to the Atlantic Ocean (VERDADE, 1998). Besides that, his occupation of anthropic environments may be an alternative for its conservation (Verdade and Lavorenti, 1990).

There are few available studies on the state or dynamics of Brazilian populations in nature and the most of them were carried out in the Paraná river basin or in the south-southeast portion of the species distribution area (e.g., Mourão and Campos, 1995; Grigg et al., 1998; Fusco-Costa et al., 2008). On the other hand, there has been a considerable research effort focusing on captive animals (e.g., Verdade, 2004; Verdade and Santiago, 1992).

The broad-snouted caiman has long been on the red list of endangered species, and currently has "Low Risk / Last Concern" status (IUCN, 2016). The species was considered endangered in Brazil until 2003, when it was withdrawn from the Brazilian List of Endangered Fauna (Martins, 2005). In contrast, Brazilian populations are still inserted in Appendix I of the Convention on International Trade of Endangered Species - CITES (Verdade, 1998).

The lack of information about wild populations imposes serious constraints on the broader development of conservation plans, such as those currently being carried out in Argentina, reported by Larriera and Imhof (2006). In addition, there is no record of available data on the natural populations of *C. latirostris* in the Rio Doce State Park (PERD), Minas Gerais.

In addition, *C. latirostris* is the Brazilian crocodilian that presents the most complex situation regarding conservation, being its natural populations strongly impacted by socioeconomic activities, since its geographic distribution area coincides with the most densely occupied areas in Brazil (Northeast, Southeast and South) (Verdade and Lavorenti 1990; Verdade et al., 1992; Mourão and Campos 1995). Moreover, their populations are fragmented, reduced, and even extinct in great part of their original range (Verdade, 1997; Borteiro et al., 2006; Verdade and Piña, 2007), and hunting for these animals can also being a problem in other regions of the country, as reported by (Filogônio et al., 2010). It is also known that they are animals found in the main Brazilian rivers, being their conservation directly related to the preservation of the hydrographic basins (Thorbjarnarson et al., 1992).

Furthermore, in Brazil, since there is a lack of information on the current status and population size of *C. latirostris*, distribution and

population ecology studies are considered of high priority (Verdade, 1998).

In this context, the present study aimed to obtain more information about the distribution, population structure, sex ratio and relative abundance of *C. latirostris* in the Rio Doce State Park, Minas Gerais, increasing thereby the knowledge about its population dynamics in Brazil.

3. METHODS

3.1. Study Area

The Rio Doce State Park (PERD) is located in the southwest portion of Minas Gerais (19º45' to 19º30' S and 42º38’ to 48º28' W). Founded in 1944, PERD (figure 1) was the first conservation unit created in the state of Minas Gerais and are located in the Rio Doce basin, in the “Vale do Aço” region, covering the municipalities of Marliéria, Dionísio and Timóteo (IEF, 2017). It is the largest and most preserved forest remnant of the Atlantic Rainforest biome in the state, encompassing an area of 35,970 hectares of native forest in various stages of succession (IEF, 2017). In addition, the Park is also the largest lake complex of Latin America, with more than 40 natural lagoons, among which stands the Dom Helvécio (figure 2) lake, with 6.7 km² (IEF, 2017). The park has been indicated as an area of extreme biological importance and priority for biodiversity conservation and scientific investigation in Minas Gerais state (Drummond et al., 2005).

We conducted the survey in five ponds of the Rio Doce State Park, were they: Aníbal, Dom Helvécio, Águas Claras, Carioca and Patos lagoon.



Figure 1: Rio Doce State Park. (From: Google Earth).



Figura 2: Aerial perspective of the Dom Helvécio lake, from the Rio Doce State Park. (from google images).

3.2. Sampling Methods

The study was carried out at night during 4-8 nights in the months of December 2015, March, May and 2016, where the caimans were sighted by their reflecting eyeshine using a sealed-beam flashlight. The exact point of each sighting was marked with a GPS. We counted all caiman we sighted and, whenever possible, we made an approaching of the caimans in order to estimate their size and capture them when possible. When the approaching was not possible, we registered the animal only as "*eyeshine only*".

For captured caimans, the capture was carried out by boat with the aid of steel cable snares following detection of caimans by their eye shine with sealed-beam headlights (Hutton et al., 1987). Small animals (less than 1m Total Length) were captured by hand, and large ones (>1m Total Length) were snared. All the animals, after the capture, were physically restrained without the use of chemical immobilization. Total length and snout-vent length of each individual were measured with a measuring tape.

The captured caimans (figure 3) were individually marked by notches in the tail scutes using a previously established numerical combination (Bolton, 1994). The caimans also had their sex determined by the examination of genital morphology (Brazaitis, 1969). After all the procedures, the animals were released in the same place that were captured.

Concerning the statistical analysis, linear regression was used to predict an accurate model for the size estimative, and the Chi-square test in order to evaluate the sex ratio.



Figure 3: Captured individual of *C. latirostris* at Patos lagoon during the field sampling in the Rio Doce State Park.

4. RESULTS AND DISCUSSION

In total, during this period of study, we recorded 277 individuals distributed along the five studied lagoons: Aníbal (174), Dom Helvécio (74), Carioca (6), Águas Claras (6) and Patos lagoon (18). We registered a relative density of 3,6 individuals/km through the entirely study area.

In comparison between the ponds, the density varied from 1.16 individuals/km in Águas Claras lagoon to 7.47 individuals/km in the Aníbal lagoon.

We captured manually or with the aid of a steel snare, a total of 97 individuals along the lagoons, and they were distributed between four size classes categories (table 1). The linear regression results are presented in figure 4. Regressions were used in order to compare the estimated size with the real size, and thus calibrate our sampling, which were sufficiently accurate ($R2 = 0, 9754$, $N=104$; $p<0,001$).

Table 1: Captured individuals of *C. latirostris* in the Rio Doce State Park, grouped in its respectives size classes; W.H. means without hatchlings. Adapted of Marques et al. (2014).

Classes	N	Snout-vent length (cm)	
		Mean(cm)	Min – Max(cm)
Class I (< 25cm)	52	15,41	11 - 19
Class II (25 - 67cm)	22	46,86	31 - 65
Class III (68 - 101cm)	21	85,52	70 - 99
Class IV (> 102cm)	2	107	102 - 112
Total	**97 ind.**	**67,58 (W.H.)**	

The density value we found might be considered as high if compared to other studies on the species, which present a maximum of 0,93 individuals/km (Fusco-Costa et al., 2008; Filogônio et al., 2010; Carvalho Jr. and Batista, 2013). This result demonstrates the importance of the region on conservation of the *C. latirostris*. More than that, the region is held on the middle of the distribution of *C. latirostris* through Brazil, being important to the gene flow between the southern and the northern populations.

The distribution of *C. latirostris* in Brazil overlaps with more occupied regions in the country, which highlight its complex situation about its conservation. Thus, the knowledge and new investigations about natural populations of *C. latirostris* inside protected areas become highly important. Moreover, our is the first report about abundance of *C. latirostris* in the Rio Doce State Park, Minas Gerais state.

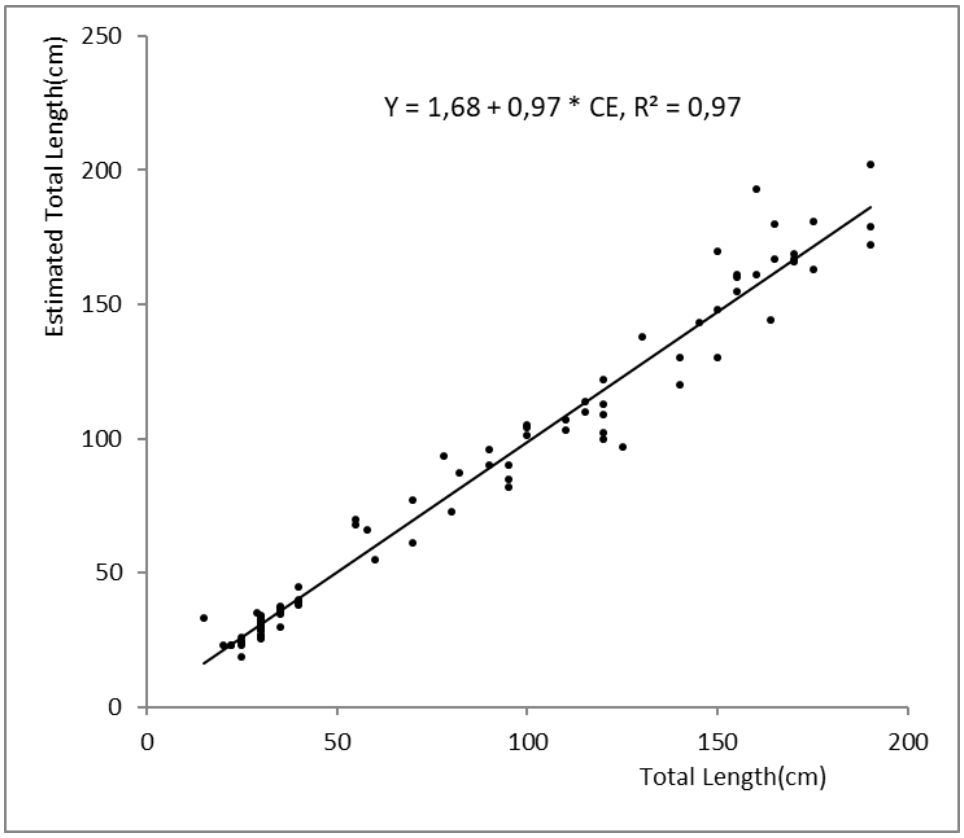


Figure 4: Calibrated linear regression results between estimated length (Y) and measured total length (X); Equation is provided above.

The number of captured animals varied according to the lagoons: 82 (84,5%) in Dom Helvécio, 10 (10,3%) in Carioca e 5 (5,2%) in Patos lagoons. The total length of the captured animals varied from 18,5 cm to 202 cm, whilst the snout-vent length varied from 11 cm to 112 cm. This result shows the existence of young healthy hatchlings as well as large reproductive males (table 1).

Besides that, from the 97 captured animals, it was possible to verify the sex on 42 individuals, since the other ones measured less than 60cm of total length. From this number, 20 individuals were males and 22 were females, showing a sex ration of 1.1 female/male (Chi-square = 0,90, DF=1; p> 0,05), with no significant difference from 1:1, which is already expected for natural wild populations. All of this already gives us evidences of a healthy and stable population in the Rio Doce State Park.

Although, only one year is not enough to take those conclusions and we aim to continue this project through the upcomer years. The continuation of this investigation is important to really knowing about population dynamics of *C. latirostris* in the Rio Doce State Park, especially in order to develop new strategies of management and conservation of this species inside the Park.

Even though the short time of study and with the data recorded until now, the population of *C. latirostris* in the Rio Doce State Park seems to be in a good state of conservation, with individuals of different size classes and a sex ration equal to the presupposed for non-impacted populations.

Finally, more contended analysis are will be made after the second year of the research project, with a better quality and quantity of data with respect to density and population structure, as well as the distribution of the species in more lagoons inside the Conservation unit.

5. FURTHER INFORMATION

There were some logistical problems during the development of the surveys. The tough access to the water corps inside the Park limited our data collection, limiting our surveys only to three lakes. Specially in this first phase of the project.

Equipment problems (boat and motor) disturbed a better sampling effort along all the seasons of the year, preventing the sampling during the months of January and February of 2016, as well as a efective sampling during December of 2015.

Although, in the close future, the research Project will continue and it will sample more lakes along the Rio Doce State Park. We are already working on acquire more fundings provided by diferente

agencies in Brazil and Minas Gerais state. Furthermore, the main results of this study, together with the new ones from 2016 and 2017, will be presented on the 8th Brazilian Congress of Herpetology, in Campo Grande, Brazil in August 2017.

6. USE OF RESOURCES

The funds provided by the Student Research Assistance Scheme at the Crocodile Specialist Group were fully used in the expenditures of field activities and payment for field guide at the Rio Doce State Park. I also used the funds to buy some field materials as snares, poles, batteries ropes and tapes. André Martins had a scholarship from Federal University of Juiz de Fora, which was also used for the spending.

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