Wild population status of Orinoco Caiman (*Crocodylus intermedius*) in Venezuela

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ABSTRACT

The commercial exploitation of Orinoco crocodile hides, which started in 1929, decimated in four decades and in its whole distribution range, the population of this species that perhaps could be counted by the millions in the past. The first evaluation on the status of this crocodile, conducted at the end of the 70`s, estimated that there were 273 individuals remaining in scattered population in the Venezuelan llanos. Ten years later more detailed investigation, particularly in the rivers Capanaparo and Cojedes, were started. More recent researches, including some currently in progress (year 2001) suggest that the population of the species is of only a few thousand individuals, most of them in the rivers already mentioned. In spite of the important effort of introduction of crocodiles in some localities, notoriously in Caño Guaritico wildlife refuge, the status if the Orinoco crocodile must be considered as precarious and we are far from the aspiration of having ten viable populations of the species, figure that was set as strategic goal in the recovery program prepared in 1994.

INTRODUCTION

The wild populations of Orinoco caiman (*Crocodylus intermedius*) were seriously reduced in its whole historical distribution area, after four decades of excessive exploitation initiated in 1929 (Mondolfi 1965; Medem 1981, 1983). Toward the end of the 1970-decade, the first evaluation of the population status of the species in Venezuela was carried out (Godshalk 1978, 1982). This study concluded that the number of *C. intermedius* in Venezuela was reduced to some 273 individuals scattered in few locations of the Llanos. Most of them (88%) were found in four sites: Rivers Capanaparo, Meta and Cinaruco of the Apure State, with 78, 67 and 19 individuals respectively, and Cojedes River (Cojedes and Portuguesa States) with 76 individuals.

Several institutions and persons were impressed by the precarious situation of the Orinoco caiman in Venezuela, liderized by Cecilia and Tomás Blohm, The Foundation for Defense of Nature (FUDENA) and the Vernezuelan Crocodilians Specialist Group (GECV), who made proposals that subsequently conformed two documents: The PLAN OF ACTIÓN (FUDENA 1993) and the STRATEGIC PLAN (PROFAUNA 1994). Strategies and goals were articulated in these plans in order to obtain the total recovery of this crocodilian in the country, in middle time. Both documents of FUDENA and PROFAUNA conformed the present Program for the Conservation of the Orinoco Caiman in Venezuela (PCCOV).

Some of the main actions designed in the PCCOV were studies on distribution, population status and ecology of this species in the wild environment, emphasizing on the system of national protected areas of Venezuela, to determine its feasibility to become in conservation centers for the species. Also, the PCCOV proposed the decree of new protected areas to the conservation of *C. intermedius*. The strategic goal of the program was the re-establishment or consolidation in 15 years from 1994, of at least 10 viable populations of Orinoco caiman in the country, in locations with optimal or good habitats of Barinas, Apure, Cojedes, Portuguesa and Guárico States (at least one location per State). In the present work, a

review of the state of the art on distribution and abundance of wild populations of Orinoco caiman in Venezuela is presented, together with a discussion on the accomplishment of the PCCOV goals.

WILD POPULATION STATUS OF ORINOCO CAIMAN

After the first studies by Godshalk (1978, 1982), the knowledge on the wild population status of Orinoco caiman in Venezuela have been substantially improved. The importance of wild populations of *C. intermdius* in the Capanaparo and Cojedes Rivers had been confirmed by several authors, suggesting that there were populations with more than one thousand individuals in the two rivers (Ayarzagüena 1987, 1990; Thorbjarnarson y Hernández 1992; Seijas y Chávez 2000). Few investigations, however, were done on the population status in other locations of the country mentioned by Robert Godshalk. Exceptions were the studies by Franz *et al*. (1985), Ramo & Busto (1986). Lately, Thorbjarnarson (1988) and Thorbjarnarson & Hernández (1992), updated the knowledge on the population status of the species. A review on the most recent information on population status in the country is presented as follows, based upon confident studies:

Apure State

Capanaparo River: The most recent data were obtained between October 2000 and June 2001 (Llobet y Seijas 2001), as part of a study funded by *Wildlife Conservation Society* (**WCS**) and **UNELLEZ**. Night light counts along the river between the sites of Las Campanas and Piedra Azul were carried out, estimating abundance values of 0,37-2,92 individuals/km (mean of 1,43 ind./km). The lowest density was detected near La Macanilla, reflecting the pressure of human activity. The calculations by Alfonso Llobet (com. pers.) allows the determination of at least 282 individuals in approximately 185 km of the river embracing the sectors Piedra Azul, Naure and Las Campanas (Fig. 1). If this estimation is projected to cover the whole area of the Capanaparo River and its effluents and associated lagoons, the total amount could be of 536 individuals. This estimation is lightly higher than the presented by Thorbjarnarson (1988) for a similar area of the river. The difference can be attributed to two factors: 1) the used methodology, since Thorbjarnarson based its results for the largest portion of the river upon censuses from airplane, while night light counts were only used in the section between Caño Amarillo and San Luis (a segment of some 25 Km of the river); and 2) the fact that between 1991 and 1993, 571 individuals were reintroduced in the Capanaparo River (Arteaga et al. 1997, although the precise number is controversial), and some of them survived and joined the population.

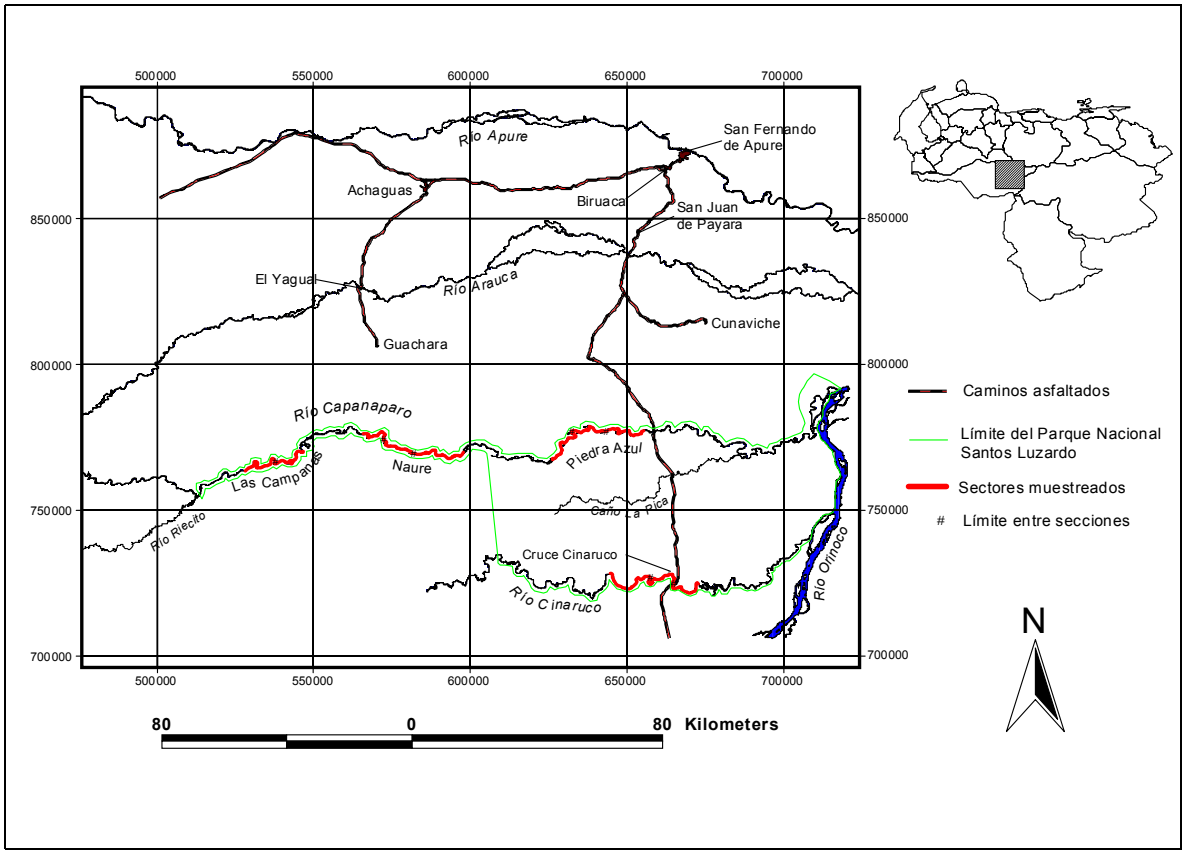

Fig. 1. Location of the Capanaparo and Cinaruco Rivers sectors sampled during 2000.

The size structure presented high proportion of juvenile(58,0%), followed by adults (24,1%) and sub-adults individuals (17,9) (Llobet y Seijas 2001). The Orinoco caiman is currently reproducing in the Capanaparo River, but there is evidence of hatchling capture to sell as pets.

Río Cinaruco: Godshalk (1978) reported a historical, relatively abundant population that existed in the Cinaruco River of *C. intermedius*, specially in the segment between the mouth on the Orinoco River upstream to 100 km. However, he considered that the population was very small due to the hunt pressure. The author could not see more than 20 animals in 485 km sampled in the river. Thorbjarnarson (1988), in observations from airplane, scarcely sighted two adults located 280 km upstream from the mouth on the Orinoco River. During the samplings carried out in June 14-16 2001, sponsored by the Fundación para el Desarrollo de las Ciencias (FUDECI) and INPARQUES, a section of approximately 50 km de río was sampled, starting form 67 km upstream the mouth on the Orinoco River (Fig. 1). No caimans were sighted. Even its existence in the river can not be assured, obviously this population have been strongly reduced. Information was collected from a US researcher who reported in 1999 that the local residents killed an adult (423 cm total length) downstream form the ferryboat cross in the main road (Arrington com. pers.).

On June 2001, 54 caimans originated in the captive breeding establishment Puerto Miranda were reintroduced in the Cinaruco River. Accordingly to colloquial not confirmed information, there happened one attempt by local residents to kill the reintroduced animals (Carlos Chávez, com. pers.).

Caño Guaritico and its Surroundings: After the decree of creation of the Refuge of Wild Fauna in Caño Guaritico and part of Caño Setenta in 1989, an intense program of reintroduction have been carried out.

The amount of liberated caimans until July 2001 in RFS and its surroundings was 1400 individuals. Evaluations performed by Lugo (1998) and Chávez (2000) showed that the incipient population started with the reintroductions is still with low density. It is difficult to estimate the size of the population inside the RFS and its surroundings, due to the obstacles to sampling during the dry season. In the long travels made by Chávez (2000), the author only observed 50 individuals, representing 8,3% of the specimens that were reintroduced two and five years before. Even there is no reports on reproduction in the RFS, 11 nests were located in the surroundings (caño Macanillal) in the year 2000 (Manuel Trillo com. pers.).

Hato El Cedral: In the caños Matiyure and Caicara, which are conforming the southern and northern limits of the hato El Cedral, 66 caimans were reintroduced until October 2001. In 1994 were released the first four animals that still are alive in the present time. Two predated nests and another with apparently unfertile eggs were located by Chávez (com. pers.) in 2001. The wild population is still incipient and the reintroduction evaluation needs time to obtain good results.

Other locations: The Meta River, is one of the environments with an important wild population reported by Godshalk (1978), but it have been not evaluated since then and there is no new information about it. Hato Garza is another private land in which 36 caimans were introduced during 2001, and this population needs some time to be evaluated.

Anzoategui State

There is colloquial information about the presence of Orinoco caimans in some rivers of the Anzoategui State, but the recent (2001) capture of a caiman in the Zuata River confirmed it. However, the available information is scarce, and a systematic study is needed in the rivers Zuata, Caris and El Pao, among others.

Barinas State

There is not knowledge about wild populations in this State. In 1994 a small population relict was reported in the Anaro River (Arteaga et al. 1994), inside the protected zone of the Forest Reserve of Ticoporo and close to the Wild Fauna Reserve of the Anaro Savannas. Recent information obtained by Fredy Garavito (com. pers) during an intense work developed in 1999-2000, indicated that the species is currently extinct in the river or its population levels is very low. Although the habitat of the river can be considered very good for the species, the human pressure on the area is very high. In the upper Caparo River there is a small wild population (Juan E. García, com. pers.) consistent maybe in few tenths individuals, which will be trapped inside a reservoir that is currently under construction.

Cojedes State

Cojedes River: Accordingly to the available information, the Cojedes River has the most dense and numerous population of the Orinoco caiman in Venezuela. (Seijas & Chávez 2000, Chávez 2000). Some 50 females are reproducing there each year (Seijas 1998). The population is concentrated, however, in the central zone of the Cojedes River system, specifically in the sector Caño de Agua. The population located at north of Cojedes River (Cojedes Norte) is isolated of the population in the central zone by the dams of Las Majaguas. Recent evaluations supported by WCS and UNELLEZ (Mendoza y Seijas 2001) reported at least 27 individuals more than one year old in Cojedes Norte from which juveniles of 90-150 cm length represented 70,3%. The population seems to be declining respect to the values reported by Seijas & Chávez (2000) and Chávez (2000). The construction of the dam of Las Palmas will cause perturbations in the habitat by the elimination of the sandy beaches, limiting its nest possibilities. Between these two dams (Las Majaguas and Las Palmas), most of the observed population (19 caimans) will be trapped and another 8 individuals or more will be isolated upstream.

The construction of Las Palmas reservoir could also affect the populations that are located downstream. Changes in river hydrology could in long term change the beaches formation dynamics. The control of flooding downstream of the new dam, which is one of the objectives of the project, will also change the use of land expanding the agriculture, and consequently the human presence will increase in zones in which the caiman population remained relatively isolated during several decades.

There is no information of wild populations in other locations of Cojedes State. Some speculations on a population in the Tinaco River (Arteaga *et al.* 1997), seems to be exaggerated, but the river had not received a serious evaluation.

Guárico State

Río Manapire: There is a relict population in the Manapire River (Jiménez-Oráa y Seijas 2001). Between December 1999 and June 2001, in a project supported by WCS and UNELLEZ, six samplings were done to the sectors Chigüichigüe and Laguna Larga of the Manapire River. In the first sector a wild population with at least 8 adult specimens (more than 240 cm total length) and 3 specimens with 120-240 cm lenth was observed. In Laguna Larga 13 individuals (8 adults and five specimens with 120-240 cm length) were sighted. In both years 2000 and 2001 two nests were located in Chigüichigüe, and the eggs were moved to a safe place to be protected from human predation. The absence of specimens with less than 120 cm LT in both sectors seems to be an indication of high human pressure. The protection of this population and its inclusion in the conservation plans for *C. intermedius* are priorities. In 2001 20 juveniles were released in Chigüichigüe, as a first attempt to improve the population in the zone.

National Park Aguaro-Guariquito: In this Park, 349 caimans originated in breed establishments were released in 2001. Evaluations in the rivers Mocapra, Faldiquera and Guariquito (Alfonso Llobet, com. pers.) indicated that the wild populations are still very small.

Portuguesa State

In the Tucupido reservoir a small relict population is located. Between December 1999 and May 2000, 7 samplings were done with night and day counts (Terán *et al*. 2001). The samplings covered about 55% of the reservoir perimeter, and only 3 caimans were sighted with 1,80-3 m total length located in the same sector. These data seems to indicate a strong declination of the population size in comparison with reports from 1993 in a similar sampling (11 individuals, Seijas & Meza, 1996). On the contrary, the population of babas (*Caiman crocodilus*), seem to increase its density of 3 individuals per kilometer traveled. Evidence was obtained that at least 2 adult caiman were killed between 1999-2000. The reintroduction effort of 26 individuals was not useful due to human pressure It is necessary to implant strong conservation mechanisms to avoid the local extinct of the species. There are no more confident data in other locations of the Portuguesa State.

DISCUSSIÓN AND RECOMMENDATIONS

This review allow us to indicate the following conclusions and recommendations:

- Although the recent studies indicates that the population status of *C. intermedius* in Venezuela is not so precarious as in the Godshalk works (1978, 1982), it is difficult to conclude that the currently reported high values are a consequence of a small population increase and this is not the result of long-term, detailed studies.
- In some locations with small wild populations (Tucupido, Anaro and Cojedes Norte), there are serious evidence of reduction in the population size.

- The knowledge of the species status in the protected areas system is low. There are systematic studies only in the National Park "Santos Luzardo".

Regarding the conformation of a protected areas system for the Orinoco caiman, the situation is as follows:

- After the decree of Caño Guaritico as Wild Fauna Refuge, no other sites have been considered as refuges for the Orinoco caiman..
- The National Park "Santos Luzardo" (Apure State) is still a key location for the Orinoco crocodile, but there is a social conflict in the zone and the local residents are rejecting the creation of the National Park, which configure uncertain future of the species.
- The National Park Aguaro-Guariquito (Guárico State) also served as location for crocodile release, but there is not a constant communication with the National Institute of Parks (INPARQUES) to coordinate actions performed in this park..
- There is any knowledge on the potential of the Wild Fauna Refuge of Chiriguare (Portuguesa State), located inside the historical distribution area of the species, as place for conservation of Orinoco crocodile.
- The Wild Fauna Reserve Anaro Savannas-Forest Reserve of Ticoporo (Barinas State), specially in Anaro River (eastern limit of the Reserve), is being currently evaluating as a potential site for crocodilian release (Fredy Garavito, com. Pers). Regarding the potential recovery of wild populations inside private lands, an important effort is carried out only Hato El Frio, with at least 394 released individuals, most of them near the Wild Fauna Refuge of Caño Guaritico. The improvement of populations in other lands like El Cedral and Garza is still incipient.
- The PCCO in Venezuela had as a long-term goal the recovery or consolidation of at least 10 viable populations of the species inside its historical distribution area. If the number of populations (10) and the considerations on the definition of viable populations is not under discussion, this goal is far away from its accomplishment.
- Several matters on the ecology of *C. intermedius*, specially those regarding reproduction, feeding, growth and demography, are now much better documented thanks to the studies by Ayarzagüena (1987, 1990), Ramo et al. (1992), Thorbjarnarson & Hernández (1992, 1993a,b), Seijas (1998), and Seijas & Chávez (2000).
- .In the case of the Cojedes River, there is a serious danger on the wild population of *C. intermedius* caused by the construction of the Las Palmas dam. The changes in the hydrological dynamics of this river could be catastrophic for the species (Seijas 1998).
- In the case of the RFS Caño Guaritico and its surroundings, subject to a great effort to obtain its population recovery releasing 1323 cocodriles since 1990, the populational restoration is still incipient. Although the decree of Caño Guaritico as wild fauna refuge was an important sep for the conservation of the Orinoco crocodile, the MARN still did not begin a program of continuous and permanent surveillance. The illegal hunting and fishing are routine in the refuge and menace with reverse the enormous effort (in terms of funds and, more important, valuable specimens of this endangered of extinction species) carried out until now.

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