CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Transfer of the population of *Crocodylus acutus* of Cuba from Appendix I to Appendix II, in accordance with Resolution Conf. 9.24 (Rev. CoP12) Annex 4, paragraph B. 2 e) and Resolution Conf. 11.16.

B. Proponent

Republic of Cuba.

C. Supporting statement

1. Taxonomy

1.1 Class:	Reptilia	
1.2 Order:	Crocodylia	
1.3 Family:	Crocodylidae	
1.4 Species:	*Crocodylus acutus,* Cuvier, 1807	
1.5 Scientific synonyms:	*Crocodylus americanus*	
1.6 Common names:	English:	American crocodile, Central American alligator, South American alligator
	French:	Crocodile américain, Crocodile à museau pointu
	Spanish:	Cocodrilo americano, caimán, Lagarto, Caimán de la costa, Cocodrilo prieto, Cocodrilo de río, Lagarto amarillo, Caimán de aguja, Lagarto real
1.7 Code numbers:	A-306.002.001.001	

2. Biological parameters

2.1 Distribution

The American crocodile is one of the most widely distributed species in the New World. It is present in the South of the Florida peninsula in the United States of America, the Atlantic and Pacific coasts of the South of Mexico, Central America and the North of South America, as well as, the islands of Cuba, Jamaica and La Española (Thorbjarnarson 1991). The countries included in this distribution are: Belize, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, United States of America, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Peru, Dominican Republic and Venezuela (Figure 1).

Through its extensive distribution the *C. acutus* is present in a wide diversity of humid habitats. The most frequent is the coastal habitat of brackish or salt waters, such as the estuary sections of rivers; coastal lagoons and mangroves swamp. The American crocodile population can also be found in the freshwater areas far from the coasts (lakes, rivers, dams) and in exceptional cases in the hypersaline waters of the Enriquillo Lake of Dominican Republic (Alvarez del Toro 1974, Thorbjarnarson 1991).

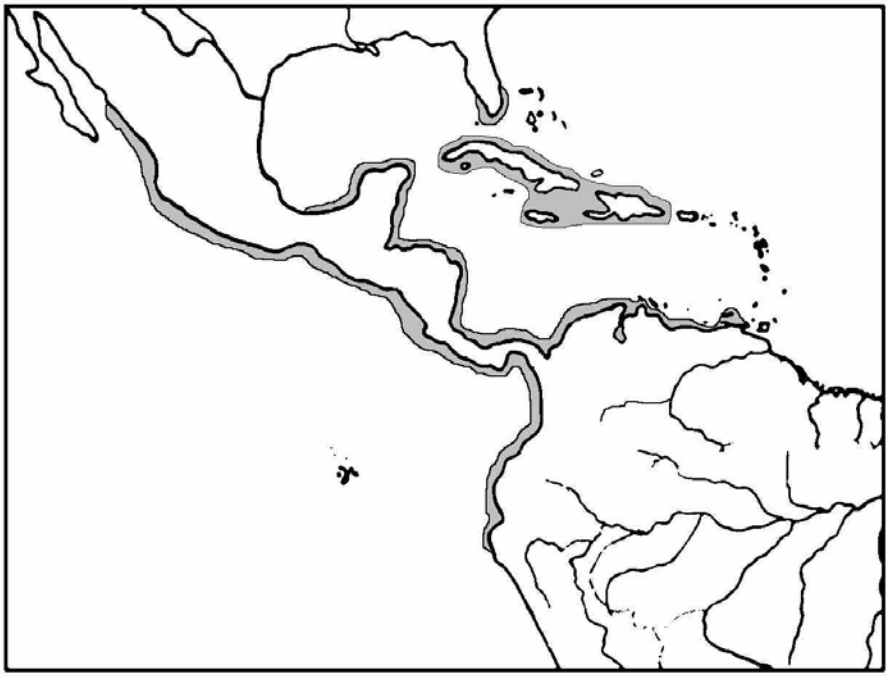

Figure 1: Distribution of the American Crocodile (*Crocodylus acutus*).

In Cuba the *C. acutus* shows a wide distribution in all the territory including islands and keys (Estrada and Rubial 1999, Rodriguez 2000, Schwartz and Henderson 1988, Varona 1986). There is presence of relatively abundant local populations in the keys of the North and South of Cuba as well as in the Lanier swamp and the brackish waters of the southeast of the Isle of Youth and the Delta del Cauto in the provinces of Las Tunas and Granma in the eastern part of the country (Varona 1985 and 1986).

Recent studies performed in Cuba in reference to the natural history of the *C. acutus* allowed a wide an updated determination of the distribution and abundance of the American crocodile in the Cuban archipelago (Figure 2, Table1).

The distribution of *C. acutus* in Cuba is listed in Table1 and is based on the data from the population studies and occasional visual reports from known and reliable sources. It can be presumed that the distribution extends to other coastal wetland areas not studied until now as well as to numerous artificial water reservoirs of which there is anecdotal information of the presence of *C. acutus* not referred in this proposal.

The information related in Table 1 contains recent reports of the presence of *C. acutus* in at least 60 localities distributed in 10 of the 14 provinces and the special municipality of the Isle of Youth including keys found North and South of the island of Cuba. Most of the 60 locations mentioned are precise places like estuaries, lagoons and beaches but some reports refer to more or less extended territories where there is ecological continuity. Such is the case of the Punta de Palms sector – Alonso de Rojas- South of Pinar del Rio province (approximately 120 km^2), the South of the Isle of Youth (where crocodiles were counted in 18 localities situated along one coastal sector of 110 km). Potrerillo point to Macurije point (which covers all the South coast of the Ciego de Avila province) and the Delta del Cauto Faunal Refuge with a 640 km^2 surface.

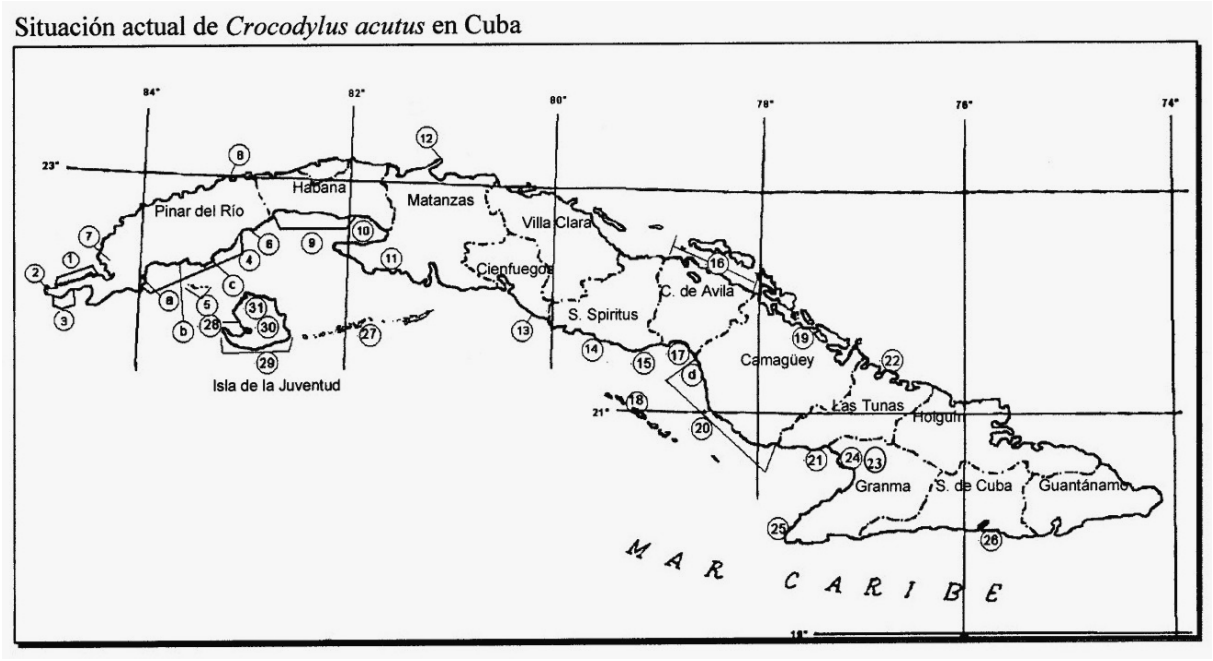

Figure 2. *Crocodylus acutus* distribution in Cuba (Rodríguez, 2000)

1. Northern coast of the Guanahacabibes peninsula (Bolondron estuary, Palma Sola, Carabelita and Sitios de Pimineta);
2. La Sorda lagoon;
3. South coast of Guanahacabibes (El Piojo cove and Larga cove);
4. South coast of Pinar del Rio from Cortes until Alonso Rojas;
5. San Felipe keys;
6. San Diego river mouth;
7. Guadiana swamp;
8. La Oritigosa;
9. South coast of Havana from Artemisa to Guines;
10. Western Zapata swamp;
11. Zapata swamp;
12. Hicacos peninsula;
13. Arimao river;
14. Protected area of Tunes de Zaza;
15. South of El Jibaro rice fields;
16. North coast of Ciego de Avila province and keys of the Savanna-Camaguey archipelago;
17. South coast of Ciego de Avila province; Ana Maria keys;
18. Jardines de la Reina archipelago;
19. Maximo River Faunal Refuge;
20. South coast of Camaguey province;
21. Delta del Cauto Faunal Refuge, Las Tunas sector;
22. La Isleta ecological reserve;
23. Birama lagoon;
24. Delta del Cauto Faunal Refuge;
25. Desembarco del Granma National Park;
26. Baconao lagoon;
27. Los Canarreos archipelago;
28. Los Indios ecological reserve;
29. Southern coast of the Isle of Youth; 30. Lanier swamp;
31. Water reservoirs of the northern territory of the Isle of Youth;
    a. Cuyaguateje river mouth;
    b. Guama river mouth;
    c. Mono key estuary; d. Baragua estuary.

Table 1. List of the localities where *C. acutus* are reported in Cuba (Rodriguez, 2000)

Localities in Cuba of recent reports of *Crocodylus acutus* (Rodriguez 2000)
Pinar del Rio Province: Coastal wetlands South of the province, from Alonso de Rojas until Cortes; The Canarreos archipelago and San Felipe keys. North coast to the Guanahacabibes peninsula, La Leña keys, coastal wetlands of Mantua municipality (Guadiana swamp) and Bahia Honda (La Hortigosa bay). Dam and derivative of the Cuyaguateje river (Guane municipality), Grande lagoon (Sandino municipality).
Havana Province: All along the South coast mainly in the Artemisa municipality (Majana beach), Alquizar (Guanimar beach), Guira de Melena (Cajito beach), Batabano (Surgidero de Batabano), Guines (Rosario and Caimito beach) and Nueva Paz (Tasajera beach, mangrove and canal system belonging to the western sector of the Zapata swamp). Artificial water reservoirs.
Matanzas Province: Zapata peninsula, South of the province; Varadero beach and Cape Hicacos in the northern coast.
Cienfuegos Province: Arimao river and Guanaraca lagoon.
Villa Clara Province: North coast: Sagua river mouth, keys of the Savanna-Camaguey archipelago.
Sancti Spiritus Province: Keys of the Savanna-Camaguey archipelago, coastal wetlands South of the province: mangrove and El Jibaro rice fields (La Sierpe municipality). Zaza dam.
Ciego de Avila Province: On the North; coastal wetlands of the Moron (Estuary Socorro and La Redonda lagoon) and Bolivia (mouth of the Caonao river and Cunagua beach) municipalities; wetlands surrounding the San Judas de Cunagua hill (Bolivia municipality), keys of the Savanna-Camaguey archipelago (Guillermo and Coco keys). On the South: coastal wetlands of the Jucaro municipality (Boca Guano and Boca Grande lagoon), Ana Maria, Jardines de la Reina and Laberinto de los Doce Leguas keys.
Camaguey Province: On the North: coastal wetlands of the Minas municipality (faunal refuge of the Maximo river mouth); keys of the Savanna-Camaguey archipelago. On the South: coastal wetlands of the Santa Cruz del Sur and Vertientes municipalities and the Jardines de la Reina archipelago.
Las Tunas Province: On the North: coastal wetlands of the Manati municipality (La Isleta faunal refuge); on the South: coastal wetlands of the Guacanayabo golf (Delta del Cauto faunal refuge) in the municipalities of Colombia and Jobabo.
Granma Province: Coastal wetlands of the Guacanayabo golf: Virama swamp (Delta del Cauto faunal refuge) in the Rio Cauto, Yara and Manzanillo municipalities. Desembarco del Granma National Park (reintroduced population close to Cape Cruz, Niquero municipality).
Santiago de Cuba Province: Baconao Biosphere Reserve (Baconao lagoon), in the South coast, Santiago de Cuba municipality.
Isle of Youth: Lanier swamp, mangrove and estuary systems of the East, West and South coasts; artificial water reservoirs of the Northern portion of the island; keys of the Canarreos archipelago (Cayo Largo del Sur, Cantilees, Campos, Matias and Rosario keys).

In 13 of the 32 localities where *C. acutus* nesting is reported it is known to occur in a gregarious and abundant way; such are the case of El Piojo creek and Mono key in the South coast of the Pinar del Rio province (8 and 50 nests respectively) and the Delta del Cauto Faunal Refuge (up to 300 nests in 10 gregarious nesting areas). In a number of localities where nests have not been reported, the presence juveniles evidences that the *C. acutus* is also reproducing there.

Only one of the 13 localities that have been object of population counts shows a relatively low abundance index (the western sector of the Zapata swamp corresponding to the Nueva Paz municipality, La Habana province); in the rest of the areas studied the abundance index are comparatively high (Rodriguez 2000).

2.2 Available and potential habitats

In Cuba the best studied populations are found in coastal wetlands where mangrove predominate with estuary regimen water flows (rivers, creeks), lagoons and salt water lagoons (albuferas). They are also found in some rivers up stream, freshwater lagoons far from the sea and in numerous artificial water reservoirs. But undoubtedly the best habitat of the *C. acutus* in Cuba is the mangroves. In fact the distribution of the species in Cuba keeps a close coincidence with the distribution of the mangrove habitat.

Cuba has a coastal perimeter of approximately 5,746 km. and close to 70 % of this extension is occupied by mangrove, with a surface of 531, 000 hectares, representing 26 % of the total forest surface and 4.8 % of the total surface of the national territory. Due to their extension the Cuban mangroves occupy the ninth place in the world; they are among the most represented in the American continent and occupy the first place among the countries of the Caribbean basin (Menendez and Priego 1994; Milan et al. 1998). In no less than 40 % of this perimeter occupied by mangrove the presence of *C. acutus* is reported and practically in all its extension it constitutes a potential habitat for the species (Figure 3).

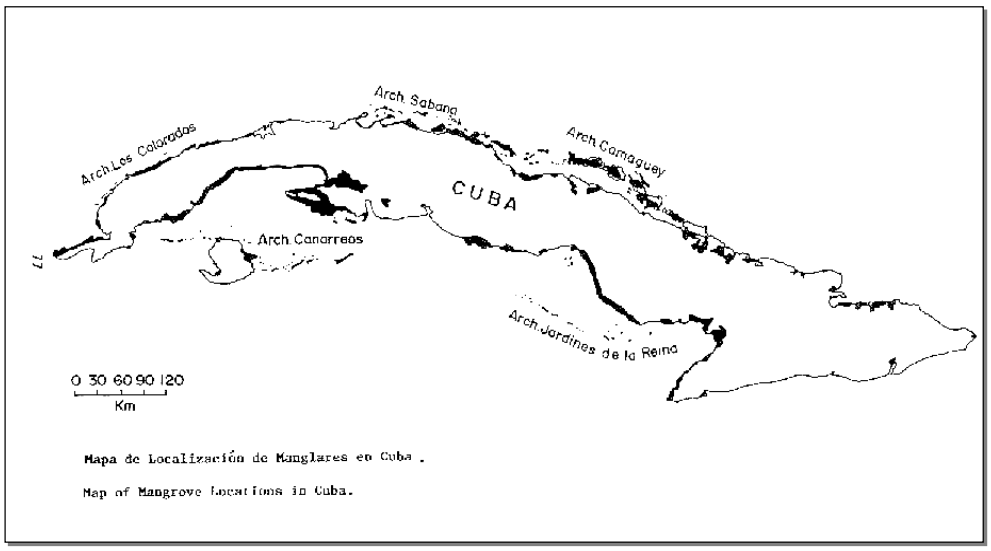

Figure 3. Distribution map of the Mangroves in Cuba (Menendez and Priego, 1994).

In Cuba the mangroves ecosystems have not suffered drastic alterations or reductions for more that 40 years; on the contrary since 1976 regulation projects were elaborated in the country with a validity of 10 years, in which management by areas are recommended, establishing a categorization of the forests for their correct planning. According to this planning 94 % of the Cuban mangroves is for protection and conservation. In addition actions of rehabilitation are performed such as forest fomenting and measures are taken, both legal and technical, against violations.

The present mangrove rehabilitation program that started in 1986 considers the direct planting of 4.3 million ungerminated seeds per year, with a survival of 53 %.

According to the program, up to 1998, more than 200 million hectares of mangrove were benefited.

With the new forest legislation and implementation of silviculture financing, more integrative criteria were analyzed for mangrove management by sustainable programs without ignoring its main functions: the conservation (Millan del Risco and Martinez 1998; The Forest Patrimony Law 1998). The recently approved decree-law of Coastal Zones Management (Law 212, 2000) confers all mangroves and different coastal zones an additional protection.

According to the map obtained by topographic interpretation at a scale of 1:250000 the Cuban terrestrial wetlands occupy 14 828 km^2 that represent 13.4 % of the emerged surface of the country. Of these 11 431 km^2 are coastal (77 %) and 2 889 km2 (19.5 %) are artificial, while the marine wetlands extend for 28 423 km^2 representing 51 % of the Cuban platform (CNAP, 2002). The representation of the wetlands is significant (25.7 %) in the protected areas of very restricted categories being the National Parks the most represented.

Many of the areas that sustain important wild crocodile populations (Zapata swamp, Delta del Cauto, Guanacahabibes peninsula, Maximo river mouth, South of the Isle of Youth and the keys surrounding the island of Cuba on the North and South) form part of the National System of Protected Areas. Three of them (Zapata swamp, Maximo river and Delta del Cauto) have been classified as Ramsar sites.

2.3 Situation and tendencies of the population and geographic tendencies

The distribution of *C. acutus* population does not show a uniform continuity and its conservation status differs between one country or region and another. The population are considered severely deteriorated in five of the 17 countries (29.4 %) where they are present and in the rest of the population they show different grades of deterioration (Thorbjarnarson 1991). Recent studies performed in Florida (Molar, pers.com.) indicate a slight increase in nesting in the South of this state during 1995-1996.

A workshop on Conservation Priorities for *Crocodylus acutus* was performed on October 2002 in the University of Florida, Gainsville in which the information on the distribution and population status of the species in all the distribution area was updated and expanded. The results of this workshop are being processed for publishing.

The population of *C. acutus* have been categorized as vulnerable (VU A1ac; Red book UICN 2000).

In 1997 the CAMP (Conservation Assessment and Management Plan) workshop was performed in Cuba in collaboration with the Specialist Group of Reproduction for Conservation, SSC, IUCN, for *Crocodylus acutus* in which the following relevant results were obtained:

– The IUCN threat category of “vulnerable” was recommended to be assigned to the Cuban population.

– The use of sustainable development based on farm breeding was recommended.

Various factors have contributed to having today in Cuba a population of *C. acutus* that is not critically threatened:

– Present and potential habitat mostly continuous and well preserved; more that 20 % forms part of the National System of Protected Areas (SNAP).

– Exhaustive environment legislation and active implementation mechanisms. As early as 1959 the closed season of the commercial hunting of crocodiles was decreed in Cuba contributing to maintaining the vast national distribution that *C. acutus* still has today.

– Since 1984 the Cuban State sponsors the National Crocodile Program with concrete goals and actions in the area of research, conservation, management and environmental education.

Figure 2 shows that *C. acutus* is widely distributed and their presence in 60 localities of the entire archipelago is reported. There are no population estimates for all these localities or an estimation of the total population since studies have concentrated in the areas of greater significance. The best studied population until now are:

Zapata Peninsula

Localized in the Southern coast of Cuba, Matanzas province approximately 22º Latitude N and 80º Longitude W occupying an area of 4520 km^2 of which approximately 2600 km^2 (57 % of this area) constitutes a permanent wetland (Romas et al. 1994). Altogether the Zapata swamps constitute the most extensive and important wetland ecosystem of the Antilles. *C. acutus* is more abundant in the peripheral zones of mangroves with brackish or salt water although it is present in fewer amounts in the interior zones of freshwater, where it is sympatric with *Crocodylus rhombifer* (Ramos et al. 1994). This study based on population counts performed between the years 1990 and 1993 reports a density of 10.4 individuals per km2 (p = 0.005; min = 1; max = 19.6 individuals/km). It is important to observe that the study covers only the interior areas of the Zapata peninsula that do not constitute the most frequent coastal habitat of the *C. acutus*. The local population of this species will be denser in the coastal mangroves with estuaries and albuferas of brackish or salt waters such as the "La Salina" Fauna Refugee and in the portion of the main stream of the Hatiguanico river, that crosses the peninsula (Ramos pers.com.).

Since the population studies are not sufficient and *C. acutus* is sympatric with *Crocodylus rhombifer* in this area, the area will not be considered as an area of egg or newborns extraction for ranching and will remain as a protected area.

Isle of Youth

C. acutus is present in the band of coastal wetlands that virtually surrounds the island on the West, South and East. It is also present in the freshwaters of the Lanier swamp where it is sympatric with *C. rhombifer* and with *Caiman crocodilus fuscus*, this last one is an exotic species found in feral status in many aquatories of the Isle of Youth (Varona 1976, Mendez et al. 2000). *C. acutus* also inhabits in rivers and water reservoirs as well as in some keys of the Canarreos archipelago (Campos, Cantilles, Matias, Rosario, among others). The counts performed in 1996 (Rodriguez et al. Unedited) in estuaries of the South coast indicate the presence of a healthy and relatively abundant population with densities of up to 6 individuals/km where numerous nests are found always present in beach dunes close to the estuaries mouth.

In a more recent population study (Lopez, Rodriguez and Berovides 2000) 18 localities were sampled along 118 km of the South coast where four types of habitat were represented: estuaries, lagoons, beaches and rivers. During the month of August 1999 the lineal density (crocodiles/km) and the age composition (offspring, juvenile and adult) of the population was evaluated by nocturnal spotlight counting and capture. Crocodiles were detected in all the sampled units. The lineal density for the total area varied between 1.1 and 33.8 individuals/km (SD = 10.655) with a general average value of 5.2 individuals/km. Fifteen mound nests were observed showing indications of having been active during the reproduction period of 1999, all located in sand dunes close to the estuaries mouths (Table 2). The general age composition was: offspring: 51.12 %; juveniles: 12 % and adults: 36 % characteristic of a growing population.

Table 2. *C. acutus* population count in the Southern coast of the Isle of Youth (López, Rodríguez and Berovides 2000).

Sampling Unit	Transect Long. (km)	N < 50 cm	N 50-200 cm	N > 200 cm	N Total	Density (Coc/km)
Playa Francés	2.70	0	0	3	3	1.11
Laguna El Cayuelo	1.60	5	2	3	10	5.00
Estero Simeón	0.47	0	0	3	3	6.37
Estero Cabo Pepe	0.73	0	1	0	1	1.36
Laguna El Inglés	0.68	0	4	2	6	8.77
Laguna Alvariño	4.58	3	0	3	6	1.31
Estero Agustin Joll	4.25	3	1	3	7	1.65

Sampling Unit	Transect Long. (km)	N < 50 cm	N 50-200 cm	N > 200 cm	N Total	Density (Coc/km)
Laguna La Carbonera	0.44	4	0	1	5	11.36
Laguna Las Canoas	3.00	8	5	4	18	6.00
Estero Los Cocos	0.47	15	0	1	16	33.76
Estero Bravo	0.44	4	0	1	5	11.34
Estero Limitete Chico	1.07	15	0	1	16	14.90
Playa Larga	2.57	0	0	8	8	3.12
Laguna Corte Viejo	0.68	13	3	3	19	27.82
Río Hato Nuevo	2.00	0	0	9	9	4.50
Estero Limitete Grande	1.00	0	1	4	5	4.98
Laguna El Bravo	0.64	4	0	1	5	7.86
Estero Canal Del Medio	1.50	3	1	4	8	5.33
TOTALES	28.8	77	18	54	150	5.20

The population studies of *C. acutus* in the Isle of Youth are not concluded and a reintroduction program of *C. rhombifer* obtained from captive breeding is ongoing through which 600 specimens have been liberated until now and have been successfully established. Thus, this area will not be considered at present for farming operations.

Delta del Cauto

It is a faunal refuge located South of the Las Tunas and Granma provinces (Jobabo, Cauto River, Yara and Manzanillo municipalities), at the bank of the Gulf of Guacanayabo, with a surface of 626 km2 (approximate geographic position: 20º latitude N; 77º longitude W). This faunal refuge constitutes the most important coastal wetland ecosystem of the eastern portion of Cuba (Jobabo and Virama swamps). In 2002 it was declared as Ramsar site.

The local population of *C. acutus* was studied during the decade of the 70´s of the past century by Ramos (1979) and systematically since 1987, population and reproduction biology studies have been performed by a team of specialists of the Crocodiles National Program. The abundance, structure and population dynamics, the nesting ecology and its productivity in relation with edaphic geomorphologic, climatic and behavioral variables have been described in detail (Alonso and Rodriguez 1998, Alonso et al. 2000. Rodriguez et al. 2002). The general results show the presence of an abundant, healthy population with a tendency to growth that has been qualified as "the best conserved local population of the species in all its geographical distribution area" (Ross pers.com; Thorbjarnarson pers.com.).

The population counts of *C. acutus* performed in the area during the period 1987-1997 (Rodriguez et al. in litt) record mean relative abundance values of 7.96 to 16.32 crocodiles/km and maximum values of up to 34 crocodiles/km.

C. acutus nesting in this wetland are concentrated in five areas of permanent nesting and five non permanent areas, which together cover a surface of 9.8 hectares. In consequence the nesting will be performed in a gregarious manner and in high density (Table 3, figure 4).

Between 1990 and 2002 annual monitoring was performed in the five permanent nesting areas (when active, monitoring is also performed in the non permanent areas), considering the following variables: total amount of nests, successful and unsuccessful nests, amount of eggs per nest, morphometric relations of eggs, hatchlings and reproducers, number of hatched and non hatched eggs, causes of egg mortality, incubation chronology, incubation temperatures in relation to newborns sex, the influence of the climatic, geomorphologic and behavioral factors in the incubation results. During this period of study a total of 2274 nests were sampled with an annual average of 193. The number of nests can be used as an indicator of the population size

(Graham 1968; Ogden 1978) and the results of nest monitoring constitute an index of the production and productivity of this population.

Table 3. *C. acutus* gregarious nesting areas in the Delta del Cauto faunal refuge (Rodríguez, Alonso and Berovides 2002).

Area Name	Surface (hectares)	Amount and Density Maximum nests (nests/hectares)	Year of maximum nests
Soloburen*	2.7	17 – 6.29	1997
Ojo de Agua*	1.9	21 – 11.05	1997
Boca de Jobabo	0.2	4 - 20.0	1995
Alto de la Jijira*	2.0	28 – 14.0	2001
Jobabito*	0.8	101 – 126.3	1998
Jobabito II	0.4	5 - 12.5	1995
Jobabito III	0.2	8 - 40.0	1995
Jobabito IV	0.2	3 - 15.0	1995
Boca de Patabanes	0.2	15 - 75.0	1996
La Salina*	1.2	94 – 78.3	2001
TOTAL	9.8		

* Permanent nesting areas.

During the season of oviposition and hatching (end of February- beginning of April and end of May-beginning of July), nests were counted in the nesting areas selected each year, by covering the area on foot daily or weekly. In most cases there were nests that went undetected in each area studied.

Not detecting nests in counts performed in the oviposition season was mainly caused by the rain that erased the tracks in the time between the egg laying and the visit to the area. During the sampling performed in the hatching season nests were detected at hatching that were not found during the sampling performed in the oviposition seasons; it is assumed that in the nesting areas there were nests left undetected, that were neither detected during the egg laying season nor did they hatch. Nevertheless, the total amount of nets reported in the area is considerably higher than those reported in the literature for other local populations of *C. acutus* (tables 4 and 5).

Occasionally, when the hatching season concluded, an exhaustive report of some nesting areas was performed with the purpose of detecting the largest amount possible of non hatched nests (i.e. years 1997, 1998 and 2000) and frequently viable embryos were found that were helped to hatch and incorporated to the population by the personnel. For this reasons the total amount of nests counted does not represent the absolute total of nests in the nesting areas analyzed, nor in the whole wetland, but instead a sample that can be considered as the minimum amount of nests. Consequently the annual fluctuations in the amount of nests do not respond totally to fluctuations in the population of female nesting but above all to variations in the sampling effort. On the contrary the fluctuations in the nesting success (per cent of successful nests) responded to two types of causes: associated to climatic factors (inundations, draught, sea movements, etc.) or associated to the behavior of the reproducing females in the areas of high nests density.

In a unified sample of 720 nests of the nesting areas of Jobabito, La Salina and La Jijira (see Table 3) the nests averaged 24.77 eggs, 17.04 hatching, 7.86 prenatal deaths and 3.92 unfertile eggs. A 62.5 % of the total eggs sample hatched (Rodriguez, Alonso and Berovides 2002, Table 6).

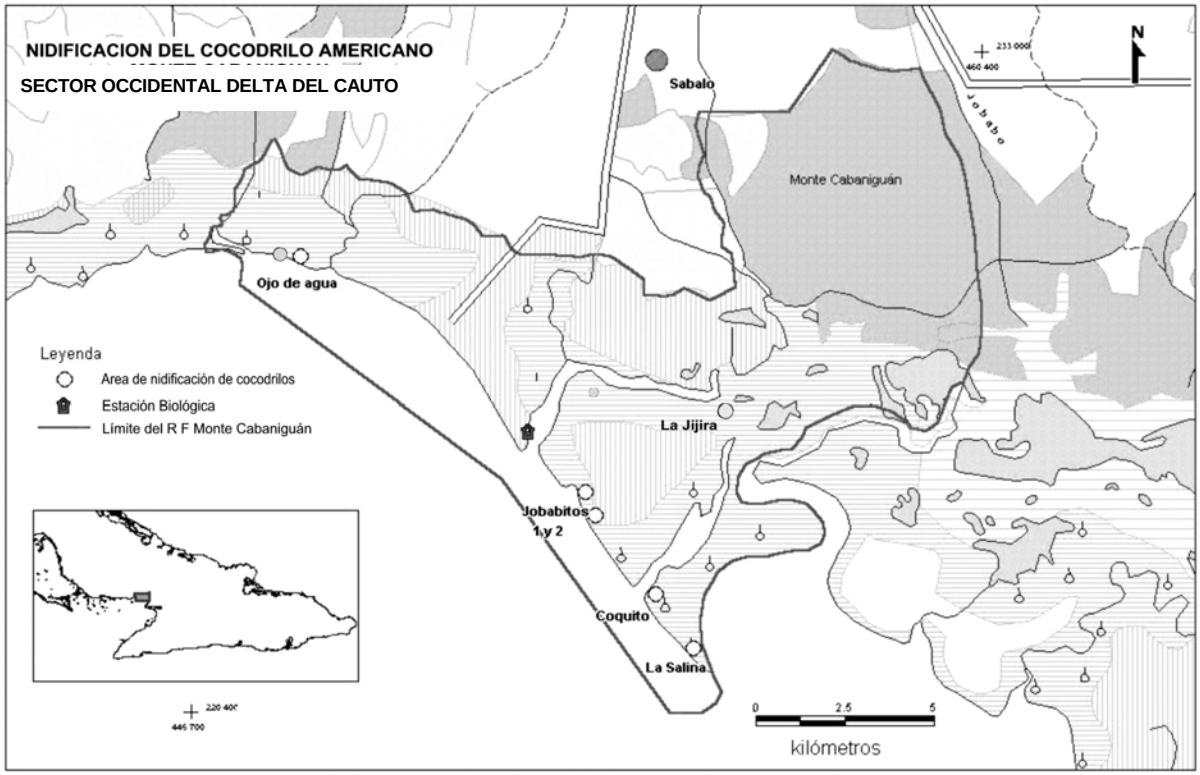

Figure 4. *C acutus* permanent nesting areas in the western sector of the Delta del Cauto Faunal Refuge.

Table 4. Results of the *C. acutus* nesting in the Delta del Cauto Faunal Refuge, 1994-2002.

Year	Total Nests in Sample	Successful Nests[1]		Non Successful nests[2]		Dead Clutch[3]		Nests totally or partially rescued by human assistance	Newborns rescued by human assistance
		TOTAL	%	TOTAL	%	TOTAL	%		
1994	196	97	49,5	99	50,5	62	62,6	37	1014
1995	196	97	49,5	99	50,5	62	62,6	37	239
1996	167	90	53,9	77	46,1	34	44,2	43	689
1997	200	176	88,0	24	12,0	15	62,5	9	
1998	300	198	66,0	102	34,0	70	68,6	32	
1999	187	166	88,8	21	11,2	5	23,8	16	
2000	175	129	73,7	46	26,3	30	65,2	16	
2001	201	82	40,8	119	59,2	44	37,0	75	39
2002	123	51	41.5	72	58,5	51	70.8	21	282
TOTAL	1745	1086	63,2	659	37,8	373	56,6	286	

[1] The nests that hatched a least one egg, with parental assistance or unassisted, were considered successful.

[2] The nests that did not hatch any egg by a natural route or where the newborns emerged with human assistance were considered unsuccessful.

[3] The clutches were considered dead when the total amount of embryos died before receiving any type of assistance.

Table 5. Comparison of the number of nests (active reproducing females) and estimated size of the local population of *C. acutus*.

Country	Locality-Year	N Nests	Estimated No. Total Pop.	References
Cuba	Delta del Cauto F.R.- 1998	300	6000-7500	Alonso et al. Unpublished
Dominican Republic	Enriquillo Lake	48	200*	Schubert and Santana 1996
USA	Florida Bay, Upper keys	20	400-500*	Orden 1978
USA	South Florida	23	220 +/-78*	Kushlan & Mazzotti 1989
USA	Turkey point canal system		17-19	Gaby et al. 1985
Costa Rica	Atlantic and Pacific coast (Sierpe-Terraba, Rambla de Sarapiqui and Nicoya Gulf)		278	Bolaños et al. 1997
Venezuela	14 costal sector localities	22	440-550*	Seijas 1986

* The figure excludes the juvenile under 1 year.

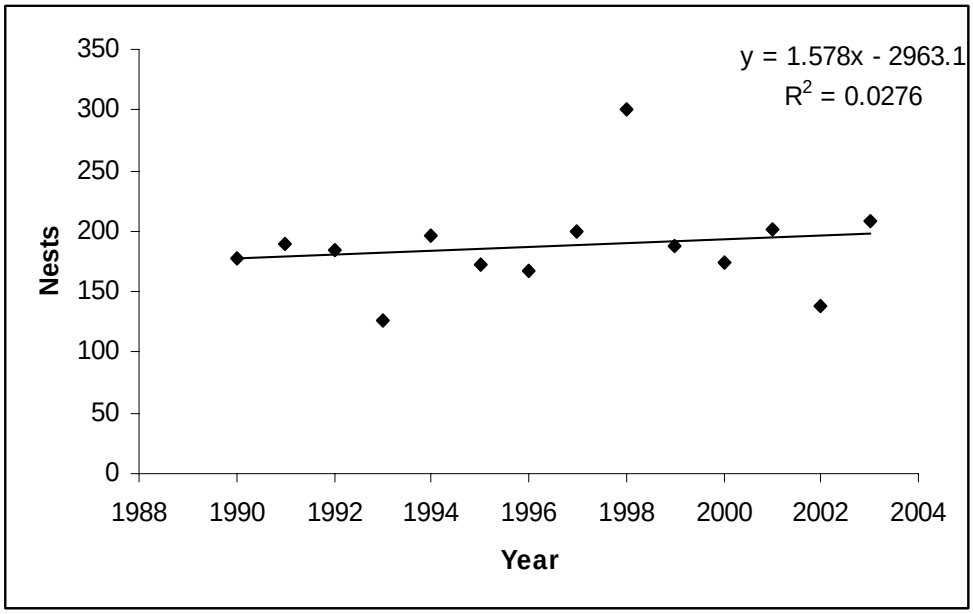

Figure 5. Tendency of the total number of nests in gregarious nesting areas of the Delta del Cauto F.R., 1990-2002.

Table 6. General results of the *C.acutus* nesting in the Monte Cabaniguan faunal refuge: sample of three gregarious nesting areas Jobabito, La Salina and La Jijira, 1992-1996.

Year	N nests	Successful nests		Total eggs	Average eggs per nest	Born			Parental deaths			Unfertile eggs			N eggs undet.
		N	%			N	Average	%	N	Average	%	N	Average	%	
Jobabito nesting area															
1992	92	92	100.0	2334	25.36	1801	19.58	77.16	236	2.57	10.11	297	3.23	12.72	0
1993	89	64	71.9	2146	24.30	991	11.09	46.18	789	9.15	36.77	355	3.86	16.54	11
1994	89	87	97.8	2307	25.73	1702	18.85	73.78	501	5.69	21.72	104	1.15	4.51	0
1995	90	89	98.9	2022	22.47	1426	16.02	70.52	446	4.96	22.06	150	1.67	7.42	0
1996	53	53	100.0	1281	24.17	822	15.51	64.17	352	6.64	27.48	107	2.02	8.35	0
total	**413**	**385**	**93.2**	**10090**	**24.43**	**6742**	**16.33**	**66.82**	**2324**	**5.68**	**23.03**	**1013**	**2.42**	**10.04**	**11**

Year	N nests	Successful nests		Total eggs	Average eggs per nest	Born			Parental deaths			Unfertile eggs			N eggs undet.
		N	%			N	Average	%	N	Average	%	N	Average	%	
La Salina nesting area															
1992	61	60	98.4	1439	23.59	1106	18.13	76.86	122	2.00	8.48	211	3.38	14.66	0
1993	36	30	83.3	874	24.28	417	11.58	47.71	379	10.53	43.36	78	2.17	8.92	0
1994	53	44	83.0	1390	25.94	779	15.27	56.04	457	8.96	32.88	87	1.71	6.26	67
1995	54	53	98.1	1276	23.63	941	17.43	73.75	236	4.37	18.5	99	1.83	7.76	0
1996	45	45	-	1117	24.82	823	18.29	73.68	148	3.29	13.25	146	3.24	13.07	0
total	**249**	**232**	**93.2**	**6096**	**24.41**	**4066**	**16.46**	**66.70**	**1342**	**5.43**	**22.01**	**621**	**2.49**	**10.19**	**67**
La Jijira nesting area															
1992	14	12	85.7	296	21.14	162	11.57	54.73	68	4.86	22.97	66	4.71	22.3	0
1994	23	0	0	746	32.00	0	0	0	171	28.50	89.06	21	3.50	13.19	554
1996	21	18	85.7	605	28.81	177	8.43	29.26	371	17.67	61.32	57	2.71	9.42	0
total	**58**	**30**	**51.7**	**1647**	**28.40**	**339**	**5.84**	**20.58**	**610**	**14.88**	**55.81**	**144**	**3.51**	**14.97**	**554**
Gen Total	**720**	**647**	**89.9**	**17833**	**24.77**	**11147**	**15.46**	**62.51**	**4276**	**6.13**	**23.98**	**1778**	**2.51**	**11.73**	**632**

Two more detailed studies concerning the nesting of *C. acutus* in this same area were performed by Alonso et al. (2000) and Rodriguez, Alonso and Berovides (2002) that cover, respectively the periods 1990-1998 and 1990-1996. These studies analyze the natural production of *Crocodylus acutus* in the 10 gregarious nesting areas (shown in Table 3) in relation with the climate and the geomorphologic characteristics of the nesting areas: the annual variations in the production of newborns is highly influenced by the effect of climatic factors that occurred during the incubation period: dry periods, intense rain, inundations, heavy sea, tides and other severe climatologic events.

These factors do not affect equally the different nesting areas. Its action is attenuated or reinforced by their geomorphologic and edaphic characteristics. In other words in the nesting areas that present a combination of more unfavorable geomorphologic factors (the most exposed to heavy sea and inundations and with deficient drainage and ventilation substrate) the climatic disturbances provoke larger losses due to embryonic death then in the higher sites, less exposed to energetic actions of the sea and with better soil draining and aeration conditions.

The quantity and quality of the available nesting habitats is strongly influenced by the coastal geomorphologic changes provoked by climatic events especially sever events such as heavy sea and exceptionally high tides, associated to hurricanes. Some of these transformations are the sweeping or elevation of the land and change in the nesting substrate (i.e. formation of a new sand dune of coarse grain, where there previously existed a low beach of fine sand inadequate for nesting) which in turn gives rise to annual differences in the grade of use of these areas reflected in the number of nests that may vary from a sudden increase to an abandoning of the area. This is the cause of the existence of non permanent nesting areas that appear and disappear with certain periodicity as the ocean movements deposit or sweep away the sand dune in its surface (Alonso et al. 2000). There is no impact of nesting habitat caused by human activity.

As a result of the influence of climatic factors in the period of 10 years between 1992 and 2002, 38.1 % of the total nests analyzed were lost (Alonso et al. 2000).

The duration of the hatching season showed a uniform behavior of 37 to 38 days with its higher frequency around the 11th of June. A clear pattern of early nesting years and late nesting years was observed (Rodriguez, Alonso and Berovides 2002 Table 7).

Table 7. *C. acutus* hatching chronology in the Delta del Cauto Faunal Refuge (Rodríguez et al. 2002).

Year	N Nests	Average hatching date	Standard deviation	First hatching	Last hatching	Duration (days)
1992	171	09 - June	68.178	25 - May	30 - June	37
1993	93	21 - June	70.769	05 - June	10 - July	36
1994	91	30 - May	111.545	05 - May	28 - June	55
1995	153	01 - June	71.159	20 - May	25 - June	37
1996	135	21 - June	84.764	09 - June	16 - July	38
TOTAL	643	11 - June	116.885	05 - May	16 - July	40.6

To determine the average size of the nests and productivity in terms of clutch achievement a random sample of 371 nests from the five nesting areas were evaluated in the period from 1993 to 2002. The productivity parameters of the nests are maintained practically constant along the period indicating a stable population (unpublished results, Table 8).

Table 8. Analysis of nest productivity in the period 1993-2002.

Year	Nests	Eggs	Average eggs/nests	Hatching	No. hatchings	% hatchings	Average hatchings per nests
1993	40	964	24,1	628	336	65,15	15,7
1994	40	1021	25,5	569	682	55,73	14,2
1995	43	1049	24,4	741	308	70,64	17,2
1996	59	1510	25,6	853	657	56,49	14,5
1997	46	1279	27,8	1014	265	79,28	22,0
1999	15	368	24,5	298	70	80,98	19,9
2000	32	839	26,2	538	301	64,12	16,8
2001	44	1240	28,2	667	573	53,79	15,2
2002	52	1318	25,3	778	540	59,03	15,0
Total	**371**	**9588**	**25,8**	**6086**	**3732**	**63,48**	**16,4**

Besides egg mortality as a result of flood or drying of the nests a significant fraction of the eggs are lost due to one of the three forms of behavior of the female a) clutch deposited directly on the ground or water without constructing a nest b) destruction of nests of other female during the construction of the nest, laying or hatching and c) abandoning the nests. The loss of clutch due to these causes represented 61.9 % of the total losses. During the period of 11 years between 1992 and 2002 an average of 31.1 % of all the nests and 26.1 % of the total estimated production of eggs were lost due to the combination of these three causes. In some years this value was of 50 % (Alonso et al. 2002). The most frequent of the three causes analyzed is the destruction of nests of other females representing 19.5 % of the total nests of the sample.

The percent of nests destroyed by other female was highly related with the density of the nests in the oviposition areas (Figure 6).

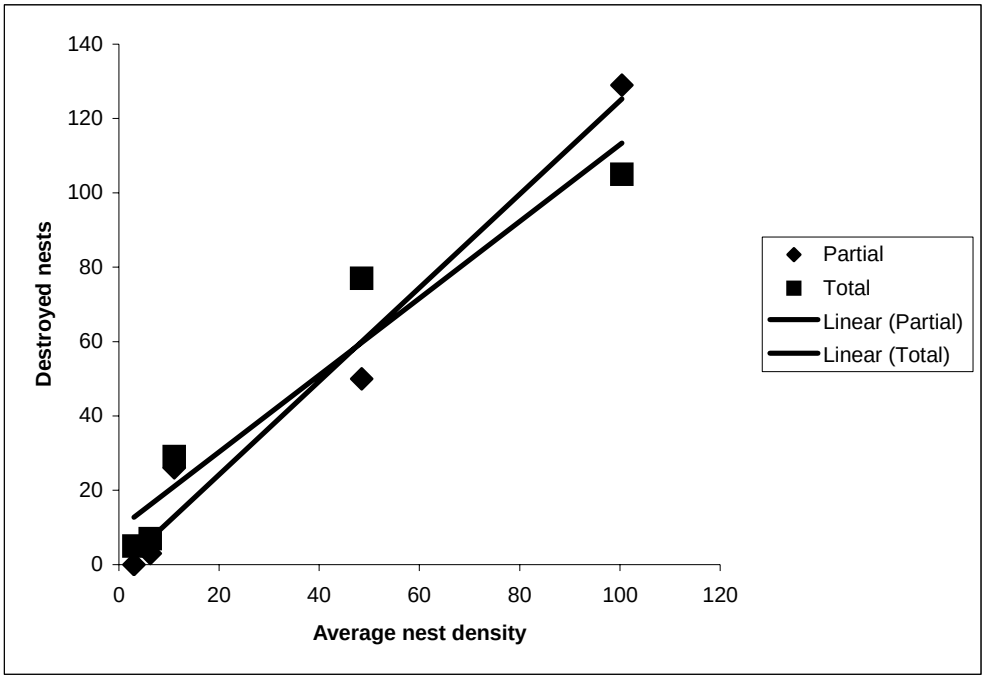

Figure 6. Number of nests totally or partially destroyed in the four main nesting areas (Jobabito, La Salina, La Jijira and Ojo de Aguja), as a function of the average density in each area during the same period of time (1993-2001).

Based on the interpretation of the tracks left by the female that abandoned clutches to the elements and with clear evidence of aggressiveness between females obtained by filming with automatic cameras, it is interpreted that the clutches are left by young females that are expelled from the nesting areas in their agonistic relations with older females (Annex). This conclusion is also based in the analysis of the size of the discarded clutches and eggs (Alonso et al. 2002).

Since 1997, the number of clutches discarded decreased due to the increase in surface and quality of the nesting areas as a result of the deposition of sand and other sediments by the heavy sea provoked by the Lily hurricane in October 1996 (Alonso et al. 2002). This is another example that corroborates the close relation between the availability of adequate nesting habitat, the effect of climatic factors, the nest density and the productivity of the population, where the available nesting area constitutes a limiting factor of a sustainable increase in number.

With the figure of 300 active reproductive females (1998) an approximate calculation can be made of the total population; this estimate is based on observations made in other Crocodylia species (Chabreck 1966-*Alligator mississippiensis*; Graham 1968-*Crocodylus niloticus*). According to these criteria the adult female that nest each year constitute from 4 to 5 % of the population. If we apply this criterion to the population of crocodiles of the Delta del Cauto F.R. we obtain an estimate of 6000 to 7500 individuals.

Between the years 1987 and 1996 a ranching experiment was performed using newborns obtained from the wildlife of Delta del Cauto Faunal Refuge. Through this experiment an average of 1400 newborns per year were collected in areas of gregarious nesting situated along the coast of the Gulf of Guacanayabo. These crocodiles were assigned to the Sabanalamar, Moron, Minas, Zabalo, Virama and Manzanillo farms for starting the breeding operations. The stock of breeding females present today in the Sabanalamar and Manzanillo farms and the group of adult and subadult crocodiles of Minas and Moron come from this ranching experiment. Part of these animals have been used latter for the introduction in natural habitat of the provinces of Pinar del Rio, Camaguey (Maximo River mouth Faunal Refuge) and Granma (Delta del Cauto Faunal Refuge; Desembarco del Granma National Park). The population studies and studies about the natural reproduction of *C. acutus* that are regularly performed in the Delta del Cauto Faunal Refuge indicate that the ranching experiment was maintained within the limits of sustainability; it did not affect the stability of the wildlife, which maintains a tendency to

increase. These studies also suggest that said tendency has been favored by a greater survival of juveniles, fast body growth and high recruitment index in the breeding category associated to the reduction of population density as a result of the successive extractions of newborns. For example, between 1994 and 1997 an increase of 111.7 % was observed in the general density of crocodiles in standardized nocturnal counts performed in the Delta del Cauto Faunal Refuge in reproduction seasons and the total amount of nests in the gregarious nesting areas maintained a slight tendency to increase (Rodriguez et al. unpublished).

In summary, the following points can be highlighted from the results of the research performed in the Delta del Cauto Faunal Refuge between 1990 and 2003:

1 The area has an abundant, healthy and growing population of *C. acutus*.

2 The nesting of this population occurs in a gregarious manner between the months of February and July in a small group of nesting beaches five of which have suffered little alteration through the years. Other nesting areas are submitted in greater grade to the modifying action of the waves, tides and inundations associated to huge rain fall that caused that some years they are used by the crocodiles and others not.

3 Every year an average approximately 38 % of the total number of nests are totally or partially lost due to the effect of climatic factors and approximately 31 % due to causes associated with the behavior of the breeding female in conditions of high nest density. If we consider there is approximately an average of 25 eggs per nest and that the annual estimated average number of nests in the period 1992 – 2002 was 193, then approximately 133 nests are affected annually by some of these mortality causes resulting in an estimated total of 3325 eggs affected. With a hatching index of approximately 62 % the egg mortality is equivalent to a loss of approximately 2016 newborns.

4 The ranching experiment performed between 1887 and 1996 showed that the annual extraction of approximately 1400 newborns did not cause a sensitive impact on the stability of the population. On the contrary, the ranching period was followed by an increase in the number of nests and a greater survival of the juveniles that remained in the area. This can be interpreted as a result of the corresponding reduction in the population density in this age category.

2.4 Population trends

See paragraph 2.3.

2.5 Geographic trends

See paragraph 2.3.

2.6 Role of the species in its ecosystem

The low coastal ecosystems characterized by the presence of estuaries and mangroves are known by their high biological productivity that extends beyond their immediate limits to the surrounding coastal waters due mainly to the abundance of nutrients that transit along them and the diversity of the habitat types and ecotones that characterize them. Although in Cuba, studies of the possible relation between crocodiles and the diverse species that are blank of commercial fishing have not been performed. The presence many of these species in the diet of the *C. acutus* in known through the analysis of the gastric contents performed in the Delta del Cauto Faunal Refuge.

The transformation action of the habitat by the crocodiles as result of their movement and nesting activity in the areas studied in Cuba is notorious. This action is manifest mainly in the long term by the opening of canals, excavation of the earth, soil turn over and formation of mounds as a result of the construction of nests. This has an influence on the local water regimen, the geomorphology and the fertility and the grade of permeability of the soil with more

or less direct consequences on other species of the flora and fauna the effect of which is not well studied.

In the Delta del Cauto faunal refuge the presence of high densities of American crocodiles in mangroves where great colonies of aquatic birds are constituted has been documented. This suggests a relation o predation of the young that incidentally fall in the nests with a possible sanitary and selective effect on the bird population. The predation of eggs, embryos and juvenile crocodiles by some of the bird species (i.e. *Chatartes aura, Phoenicopterus ruber, Colaptes auratus, Ardea herodias, Padion haliaetus, Fregata magnificens*) has also been documented in this faunal refuge and a curious opportunistic behavior of the Cuban iguana (*Cyclura nubile nubila*) that takes advantage of the soil turn over caused by the nesting activity of the *C. acutus* to make their own nests with less energetic waste.

Among the numerous interspecies relations that characterize the American crocodile maybe the most important one, due to its possible mid term consequences, is the hybridization with the Cuba crocodile (*C. rhombifer*) in areas where these species are sympatric: the Zapata and Lanier swamps. This phenomenon has been widely documented by Ramos (1994, 2000, 2002) in the case of the Zapata swamp.

2.7 Threats

The main threats to the *C. acutus* wildlife in Cuba are indirect since they are those that in greater of less intensity affect the mangrove ecosystems. These can be of natural or anthropic origin. Milan et al. (1998) quoted among the threats of natural origin the draining, the increase in coastal lagoons, the coastal erosion, the accumulation of sand, cyclones and hurricanes and among the threats of anthropic origin the spillage of residuals, forest fires, the silviculture and the inadequate constructions and dams in rivers and creeks.

Nevertheless, according to the result of recent studies (Alonso and Rodriguez 2000; Rodriguez and Alonso 2002) at least two of the referred natural causes: the increase of coastal lagoons and the accumulation of sand caused by meteorological events may cause direct benefit to the wild crocodile population: in the first case due to the important refuge function of the coastal lagoons during the nesting stage, the hatching and the first months of life of the crocodiles and in the second case by increasing the available nesting area and improving those already existing (see section 2.3).

Among the anthropic causes of threats, river and creek dams, although they can alter the water regimens and salinity in detriment of the mangrove areas located downstream, they also provides additional habitat for the *C. acutus*, increasing their distribution area as shown by the increasing presence of specimens in artificial water reservoirs recently constructed.

With respect to water contamination, the most aggressive residuals are those from the industrial elaboration of sugar (must) that in extreme cases can cause massive deaths of fish and other aquatic organisms that constitute part of the diet of the crocodile or have direct toxic effect on the latter. These cases are ever less frequent in Cuba where there is a solid and well implemented environmental legislation that in forces the use of efficient systems of regulation and treatment of water residuals of industrial or urban origin. In 2000 a restructuring of the sugar industry began in the country that contemplates among other measures the dismantling of 70 sugar mills reducing in almost 50 % the eventual must emission sources. Additionally a program is developed in the country for the substitution of imported chemical pesticides for biological pesticides of national production, thus reducing the other important source of contamination of waters that pour into the coastal wetlands.

As direct threats of low magnitude are the seldom cases of furtive crocodile hunting for local meat consumption as well as the accidental capture during fishing. The insular condition of Cuba (absence of land borders) and the existence of an extensive and detailed environmental legislation that explicitly includes the closed season of crocodile hunting and the protection of the habitat create the conditions for an appropriate scenario. There are effective mechanisms for implementing this legislation (Body of Forest Keepers, the Body of Inspectors of the Office of Fishing Inspection, the Body of Environmental Inspection and the General Customs of the

Republic) that facilitate an effective protection against crocodile hunting and the counterfeit of skins and facilitate the control of the production of the different breeding farms. In addition to all this the most important crocodile populations and habitats of the country (Zapata and Lanier swamps, South of the Isle of Youth, Guanacabibes peninsula, almost all the keys of the Cuban archipelago) form part of the National System of Protected Areas and are benefited by a protection regimen.

3. Utilization and trade

3.1 National utilization

During the first years of the Republic founded in 1902, hunting and trade of crocodiles was legal and was not subject to regulations of conservational type. As almost everywhere the criteria that predominated was the market demand of skins (there are no references of commercial use of the meat in this period) and these products were mainly destined to the internal market and to the market of the United States. Crocodile hunting together with the crafted production of charcoal and fishing activity were the only income sources for the population of the Zapata swamp and other coastal wetlands of the country. The criterion then was that crocodiles constituted an undesirable plague.

Both the Cuban crocodile and the American crocodile were hunted with commercial purposes since the second half of the XX century until de decade of the 60's of the XX century but there are no records of the localities and volumes of extractions. The localities in which both species are most exploited historically are the Zapata and Lanier swamps (Rodriguez et al. 2002). Juan A. Cosculluela in his book "Four years in the Zapata swamp" (1904) comments that in the term of 10 years, 90 thousand crocodiles had been hunted in that territory, without referring to specific species.

The only records available of commercial exploitation of the American crocodile in the eastern region of the country are anecdotic and date from interviews performed by Manuel Alonso (per.com.) to fisherman living since 1936 in the area now occupied by the Delta del Cauto Faunal Refuge. Towards the decade of 1940 commercial hunting was performed in a crafted manner together with other activities such as charcoal elaboration and fishing. The success of hunting varied during the year and declined in the following years after an initial period in which up to 40 crocodiles could be hunted in one night. The skins were bought by local merchants for exporting.

Crocodile hunting in the Virama swamp resulted in an impoverishment of the resource. Towards the beginning of the decade of the 50's of the XX century it stopped being commercially viable due to the scarcity of the specimens. The old local dwellers say the crocodiles stayed relatively scarce in the Virama region until the mid 60's. In 1964 after the devastating effects of the Flora hurricane (October 1963) the human population living along the coast of the Gulf of Guanacayabo was relocated in the city of Manzanillo and the area was left practically uninhabited until now.

3.1.1 Captive breeding

Two state institutions are in responsible of the crocodile breeding operations: The Fish Industry Ministry (MIP) and the National Enterprise for the Protection of the Flora and Fauna (ENPFF, Ministry of Agriculture). The MIP operates a closed cycle breeding farm at Boca de la Laguna del Tesoro, Zapata swamp established in 1959. At the beginning in this farm the Cuban and American crocodiles were kept together in great pens resulting in a considerable hybridization.

The fishing statistics of the FAO reveal that during 1976, 1977 and 1980, 531 metric tons of crocodile meat were used which supposes a sacrifice of thousands of specimens presumably hybrids most of them resulting from the genetic selection work for obtaining a pure stock of Cuban crocodiles.

In 1994 the farm was registered in CITES (A-CU-501) allowing exporting crocodiles and their products. The previous exploitation of crocodiles in this farm had been focused on the meat for the local market.

In 1984 began the National Crocodile Program sponsored by ENPFF. The lines of work of this program include the development of crocodile breeding for commercial use in farms. Thu in 1985 an experimental program began through which from 1985 to 1993 seven farms were established. One of these farms, Cayo Potrero in the Isle of Youth, is dedicated to the reproduction and breeding of *Crocodylus rhombifer* supporting a program of reintroduction of the species in the Lanier swamp and which is not part of this proposal. The other six farms handle *Crocodylys acutus*. Together these six farms maintained in June 2003 a stock of 7 955 captive *C. acutus*. In two of them (Sabanalamar in Pinar del Rio province and Manzanillo in Granma province) the crocodiles reproduce successfully in controlled conditions (F1, Table 9).

Table 9. Summary of the *C. acutus* crocodile farms operated by ENPFF. 2002.

Farm	**Province**	**Life specimens in captivity**				
		Inicial < 50 cm	**Juveniles 50 – 200 cm**	**Subadults and adult non breeders > 200 cm**	**Breeders**	**Total**
Sabanalamar	Pinar del Río	567	198	21	25	811
Morón	Ciego de Avila	241	198	251		690
Minas	Camagüey	17	95	255		368
Zabalo	Las Tunas		57	103	8	1168
Virama	Granma	242	105	1237		584
Manzanillo	Granma	1808	2230	0	297	4425
TOTAL		2875	2883	1867	330	7955

The main functions of these farms has been to develop a mechanism for the interaction of populations maintained in captivity with wildlife and their habitats (i.e. through reintroduction) and develop an infrastructure, the technical capacity and the necessary personnel for performing commercial breeding (Rodriguez 1995). Since 2002 small commercial operations have been performed sporadically consisting in sale of meat to tourist entities within the country. The skins resulting from the sacrifice of these specimens have been incinerated.

The six farms dedicated to handling *C. acutus*, object of this proposal, started their operation with crocodiles captured during the hatching season in the Delta del Cauto Faunal Refuge. With this purpose between 1987 and 1996, 500 to 1400 newborns were extracted from the Delta del Cauto Faunal Refuge and were distributed between Jobabo, Minas, Sabanalamar farms since 1987; Virama since 1998 and Manzanillo from 1991 to 1996. The present situation of the six farms is described below.

Sabanalamar Farm

Located in the Pinar del Rio province, Guane municipality. The Sabanalamar farm started to operate in 1986 with a group of 10 crocodiles (6 females and 4 males) captured in the wetlands of the Isle of Youth. This population was increased in 1987 with 400 newborns collected in the Delta del Cauto faunal refuge. Since 1989 the crocodiles reproduce successfully in captivity in this farm (F1). Table 10 shows the breeding results until the end of 2002. This unit has today a total mass of 811 crocodiles (June 2003; Table 9).

Since 1995 part of the production of his farm has been destined (and will continue to be destined in the future) to a reintroduction program in the coastal wetlands of the Guane municipality, South of the Pinar del Rio province; for this purpose until now 756 specimens have been liberated. The reintroductions have been performed in a programmed manner (in compliance with the Guidelines of the Specialists Reintroduction Group of the UICN) but also the wildlife has increased as a result of an occasional escape provoked by inundations associated to the pass of hurricanes. There is no rigorous evaluation until now of the result of these reintroductions.

Table 10. Breeding in controlled conditions in the Sabanalamar farm, 1995-2002.

Category	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
Breeding females	20	20	22	21	20	20	21	19
Breeding males	9	9	9	10	10	10	11	9
No. nests	5	13	15	13	15	18	16	15
Eggs per nest	36.4	39.6	38.8	56.4	30.9	37.8	33.8	32.4
No. born	53	250	110	297	310	407	324	252
Hatching %	34.8	49.6	22.0	53.8	67.8	65.9	62.1	52.6

The farm was constructed taking advantage of the natural configuration of the land. A series of small lagoons were adapted as reproduction and growth pens to which was added a battery of artificial pens for raising juveniles up to 1 year old. The egg incubation is performed in outdoor sand beds.

This farm has a simple tourist infrastructure that constitutes an alternative source of financing. The facility also serves as a teaching area for environmental teaching activities directed to scholars of the province.

Moron Farm

North circuit between Moron and the Bolivia municipality, Ciego de Avila province. In June 2003 the farm had a population of 690 crocodiles. Their distribution by age category is shown in Table 9.

The operation of the Moron farm started in October 1995 with the introduction of 400 newborns collected from the Delta del Cauto Faunal Refuge. Later the population increased with 249 subadults sent in 1998 from the Minas farm and later in the year 2000 another 400 newborns entered from the Manzanillo farm.

The constructive project of the Moron farm corresponds to a stepwise execution project. Today besides the administrative facility there are 8 cubicles for raising juveniles and 3 pens for the subadults as well as an exhibition pen that forms part of its insipient tourist infrastructure.

Minas farm

Founded in 1988 this farm is located at 50 km of the city of Camaguey in the highway Minas-Solas. The present population (June 2003, Table 9) is of 368 crocodiles. This farm has 24 concrete cubicles of 1.5 X 1.0 m for the newborns, 12 hexagonal cubicles of 81 m^2 and 6 pens of 170 m^2 for raising juveniles. There are two other pens of 828 m^2 for subadults and a collective breeding pen of 7200 m^2.

From 1990 a reintroduction program began in the nearby Maximo Rive Faunal Refuge by which approximately 400 animals have been liberated in this area until now.

Zabalo Farm

It is located in the Manuel Zabalo community of the Jobabo municipality, South of the Las Tunas province and in the periphery of the Delta del Cauto Faunal Refuge. This farm started to operate in 1987 with 700 newborns collected in the Delta del Cauto Faunal Refuge. The collection of newborns continued until 1996. In different years since 1990 more than 700 crocodiles of different sizes have been liberated to the environment in the Delta del Cauto Faunal Refuge and the Desembarco del Granma National Park. The composition of the herd in this farm in July 2003 is referred in Table 9.

Manzanillo Farm

Located in the periphery of Manzanillo city next to the Gulf of Guanacayabo (South of the Granma province). The installation occupies a surface of 21.44 hectares in which breeding and growth pens can be found as well as incubation areas and an administrative area.

This farm started operating in 1991, with a group of 500 crocodiles born that same year in the Delta del Cauto Faunal Refuge. Between 1991 and 1996 other entry of juvenile crocodiles from the same source and amount were performed.

The farm has a total population of 4 425 crocodiles (June 2003, Table 9). In this farm satisfactory body growth indexes have been obtained and since 1999 breeding occurs under controlled conditions (F1). The breeder mass is constituted by the same crocodiles that were brought to the farm as newborns in 1991 and grew there. The first crocodiles were incorporated to breeding at the age of 7 years with sizes over 180 cm (total length), which is considered as an early recruitment. Tables 11 and 12 summarize the main breeding indicators obtained in this farm until 2001.

Table 11. Breeding data in the Manzanillo farm (1998 – 2001).

Year	No. females	No nests	No. eggs	Incubated eggs	No. born	Dead embryos	Fertilized eggs	Average eggs/nests
1998	244	21	362	353	18	88	234	17.2
1999	244	71	1580	1545	22	924	597	22.3
2000	240	141	3511	3288	1328	1589	223	24.9
2001	239	124	2927	2826	1201	1541	41	23.6

Table 12. Breeding efficiency indicators in the Manzanillo farm (1998 – 2001).

Year	% females incorporated	Birth rate (%)	Fertility (%)	Survival 1st year	Offspring per apt female	Offspring per fertile female
1998	8.6	5.0	33.7	66.7	0.07	0.86
1999	29.1	1.2	61.4	50.0	0.09	0.31
2000	57.8	40.4	93.2	89.4	5.44	9.42
2001	51.9	42.5	99.0	87.5	5.02	9.68

The Manzanillo farm has operated as an experimental center where the zootechnical parameters for breeding in captivity are improved. Part of its product has been destined to other breeding farms and to the reintroduction in wildlife.

Virama Farm

It is located in the Rio Cauto municipality South of the Granma province, in the periphery of the Delta del Cauto Faunal Refuge, Virama swamp sector. It started to operate in

1988 with a group of newborns collected in the Faunal Refuge. The farm has a mass of 1584 crocodiles (June 2003, Table9). The farm has a modest administrative infrastructure and a battery of 24 pens of 1.5 m^2 for newborns, 12 pens of 81 m^2 for raising juveniles and 5 large pens of 400 m^2 for growth.

The crocodile farms of Cuba contribute to conservation. The Cayo Potrero farm in the Isle of Youth produces specimens of Cuban crocodiles for the reintroduction in the Lanier swamp; the farms of Sabanalamar, Moron, Minas, Zabalo and Manzanillo besides breeding crocodiles for the local reintroduction programs they develop research and handling activities of the wild crocodile populations and their habitat. Research is performed on growth and development, feeding, breeding and animal health. All these farms function as centers for environmental education in the communities and schools of the locality.

All the farms are related to nearby natural areas with *C. acutus* wildlife where the introduction of *C. acutus* coming from the breeding farms is performed or will be performed in the future, if necessary. Until today approximately 2000 individuals obtained through the program have been liberated to the protected areas of the Pinar del Rio, Camaguey, Las Tunas and Granma provinces.

A small group of C. acutus is kept in captivity in the different zoos of the country with breeding in captivity in some of them.

3.2 Potential for licit trade

Although the *C. porusus, Alligator mississippiensis* and *C. rhombifer* among other species are considered of superior quality and already have a presence in the international market the skin of *C. acutus* classifies among the classic ones reaching good prices and eventually surpassing other crocodile species.

C. acutus as all the crocodiles is considered among the species commercialized with medicinal purposes; the most used parts for this purpose are the squamous bones, bile, bile vesicle, teeth (CITES 2002).

Although in Cuba there is capacity for the industrial curing of skins in general the country does not have today the ideal technology to cure crocodile skins with a classical finish. At present most of the skins produced are exported conserved (humid salted) and a fraction may be exported benefited until crusted. With the parts of the skin less appropriate for industrial curing for fur trade local handcraft productions can be developed and there is sufficient demand for the meat in the national market.

The exportation of live animals for zoos and scientific institutions is also considered.

Today there is approximately 2000 *C. acutus* in the six farms with sufficient size to be commercialized. If the present proposal is approved by the parties trade can begin on the date of it comes into effect.

3.3 Illegal trade

The illegal trade hunting of *C. acutus* in Cuba is limited to isolated cases with the purpose of meat consumption by the family in some rural areas and an illegal trade in small scale of souvenirs for tourists.

The analysis of the data recorded by WCMC since 1980 to 1997 shows that in this period only 26 specimens of *C. acutus* have been illegally traded from Cuba and all of them as taxidermies (Table 13, Alvarez 2000).

Table 13. Specimens of *C. acutus* from Cuba illegally traded reported by WCMC in the period 1980-1997 (Alvarez, 2000).

Year	Country	Specimen	Quantity
1980	USA	Taxidermy	1
1984	USA	Taxidermy	9
1986	Italy	Taxidermy	1
1988	Italy	Taxidermy	1
1988	Italy	Taxidermy	1
1992	Luxemburg	Taxidermy	5
1992	USA	Taxidermy	2
1993	USA	Taxidermy	2
1994	Spain	Taxidermy	1
1995	Spain	Taxidermy	2
1996	USA	Taxidermy	1
TOTAL			**26**

A study of the trade of specimens for tourist souvenirs elaborated with *C. acutus* and other crocodiles based on surveys and inspections to the selling establishments, in the reports on confiscations of the General Customs of the Republic (AGR), as well as in data of the CITES Administrative Authorities of Cuba and the data base of the World Conservation Monitoring Centre (WCMC) in the years 1996, 1997 and 1998 shows a clear tendency of a decrease of the cases which is confirmed by a regression analysis (Figure 7). In each quarter the number of specimens confiscated in the period decreased in an average of approximately 2 specimens (1.91 in the calculation). The lineal relation quarter-amount confiscated was of 73.4 % resulting highly significant ($p < 0.001$). Independently of this the proportion of specimens/quarter remained constant between quarters during the three years analyzed ($G = 3.2$; $p > 0.05$), indicating that this trade is random and fortuitous with no relation with the number of tourist that visit the island. The tourist that more frequently influenced are the nationals of the following countries: Russia (21.62 %), Spain (20.0 %), Italy (17.20 %), Cuba (14.05 %) and France (9.19 %) in total the citizens of these 5 countries were involved in 82.2 % of the cases occurred in the period. In the case of the Cubans the figure refers to residents other countries (Alvarez 2000).

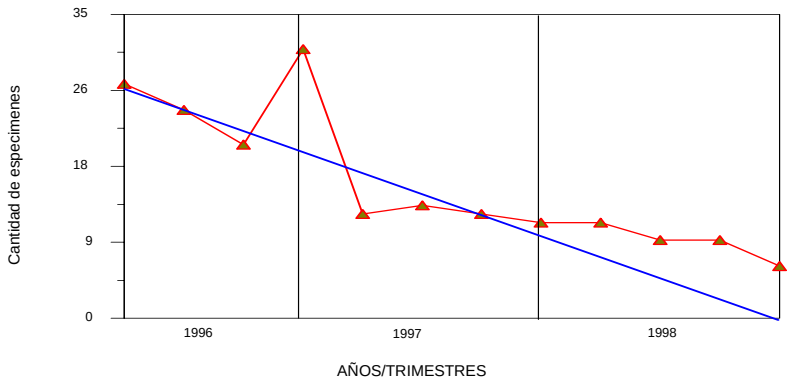

Figure 7. Scattered plot and regression line of the number of specimens of *Crocodylus sp.* Confiscated quarterly in the years 1996, 1997 and 1998. N = 12; Y = 27,82 – 1,91X; R^2 = 73,4 %; r = - 0,857 ($p < 0,001$).

3.4 Real or potential effects of trade

Crocodiles have good conditions to be farmed in a sustainable way and constitute an excellent example of how trade based on the sustainable use and administered by CITES can improve the situation of conservation of the species as has been recommended by the Crocodile Specialists Group (CSP) of the CSE/UICN. Abiding to legal forms of international trade of crocodile skins under the CITES regulations gives the conservation of crocodiles a solid base with beneficial demonstrable effects. The population of crocodiles adjusts well to control breeding of their eggs in ranches. The high natural mortality of the eggs and the recently hatched offspring and the processes of recruitment of the population that depends in great measure of the structure of the adult population make it possible to withdraw the effects with an insignificant effect on recruitment (UICN 1997). During the last 10-20 years and particularly since the Agenda 21 appeared in 1992 there has been a change in the relation between conservation and trade. Initially seen as a problem for conservation, trade has been increasingly adopted as a solution for conservation. The Crocodile Specialists Group of IUCN/SSC has responded positively as a facilitator and arbiter in this process working with commercial factors to promote the sustainable use, eradicating the non sustainable breeds and illegal trade. The experience of the CSG is that where trade is adopted as a conservation tool no one wants to see the illegal trade or lack of ethics prosper. There have been no more reports of significant illegal crocodile trade in various years (CSG 2000). The Parties of CITES recognize that licit trade of one species should not increase the illicit trade in any place of its distribution area and that commercial exchange may favor the conservation of species and ecosystems if it is performed at levels that do not damage the survival of the species concerned (Resolution Conf. 8.3).

In Cuba all productive and commercial activity of importing-exporting is performed through or with the direct intervention of State agencies; there is no large scale illicit trade of skins and other crocodile products nor the practical possibility of performing it. The insular condition of the country makes counterfeit through land borders impossible.

The activity of farm breeding under strict monitoring control by the CITES Administrative Authorities and by marking the farm animals and their products together with the safe control of all type of foreign commercial operations leaves no space for illicit trade.

On the contrary, the sustainable exploitation of *C. acutus* will benefit the conservation of this species and other species of the wild flora and fauna that share the habitat with the crocodiles by providing an additional economical incentive to conservation at the official level and of the rural community in direct contact with the resource.

Nationally the operation and administration of all the *C. acutus* farms as well as the protection of the ranching areas is under the responsibility of one state company, no national or foreign private entities are involved in the operations of collection and breeding.

The National Company for the Protection of the Flora and Fauna is in charge of the administration of various categories of handling the National System of Protected Areas (SNAP) (over 40 protected areas today) and develop 265 programs of research and handling of species and populations of the flora and fauna of the protected areas and other related resources. Thus the economical benefits derived from the commercialization of *C. acutus* will benefit not only the conservation of the species but also the natural habitat and programs directed to other species such as the *Amazona leucocephala, Grus canadensis, Solenodon cubanus, Crocodylus rhombifer, Aratinga euops, Trichechus manatus, Dendrocygna arborea*, etc., that are financed and developed by this company.

The commercialization of the skins and other products will allow obtaining resources that would add to the contribution by the Cuban State of approximately 1 million pesos per year for the program of crocodile conservation, to improve the technical, handling and working conditions in the farms and the conservation of wildlife and their habitat. Additionally increasing the resources through commercialization will generate employment for the local communities.

3.5 Captive breeding for trade outside the country of origin

At present there are three farms registered in CITES, dedicated to captive breeding of *C. acutus* with commercial purposes: A-CO-501 and A-CO-502, in Colombia and A-HN-501 in Honduras.; the prognosis of juvenile breeding for the year 2003 in the two farms in Colombia is of 1300 and 900 offspring respectively and the production of the Honduras farms was of 9260 offspring in the 1996 (CITES 1999).

4. Conservation and management

4.1 Legal status

The Constitution of the Republic of Cuba, in its Article 27, establishes that:

> "The State protects the environment and the natural resources of the country. Recognizing its close relation with the sustainable economical and social development that makes more rational human life and assures the survival and wellbeing and the security of the present and future generations. Corresponding to the competitive organs the application of this policy.
>
> It is a duty of the citizens to contribute to the protection of the water, the atmosphere, the conservation of the soil, the flora, the fauna and all the potential richness of nature."

Cuba has an adequate legal frame to develop the work concerning CITES at the national level. Among the tools it has for this purpose we can mention Law 81 of Environment, the Forest law, the Customs law, the CITMA Resolution 87 of 1996 to implement CITES and Resolution 111 of 1996 on biological diversity, among others. It also has the appropriate legislation for inspection and sanctioning the infractions (Decree-Law 200/2000, on the contraventions in aspects of environment, Decree-Law 168/1996 on Fishing).

At the international level C. acutus is protected by CITES and Cuba has an adequate legal frame for implementing CITES at the national level (Category 1).

Cuba is also part of the Biological Diversity Convention, of the RAMSAR Convention on wetlands (with 6 RAMSAR sites including the main areas where *C. acutus* is present) and the SPAW Protocol that protects *C. acutus* in its Annex 2.

4.2 Species management

Cuba will maintain a program of monitoring of the wildlife of *C, acutus*, especially in the Crocodile Conservation Units (UCC) identified in the Workshop on Conservation Priorities for the *Crocodylus acutus* (performed by Wildlife Conservation Society-WCS-in Gainsville, Florida in 2001- in press). A) Isle of Youth and the Canarreos archipelago; b) South of the Pinar del Rio province, Guanacabibes peninsula and San Felipe keys; c) Zapata swamp; d) Delta del Cauto until South of the Ciego de Avila province and Jardines de la Reina archipelago; e) North of Camaguey province. The studies of the biology of the species and the situation of their populations will be maintained and expanded. The Cuban State will maintain the economic support to guarantee the conservation of the species.

Likewise the habitat conservation programs will be guaranteed, according to what is established in the national legislation and in compliance with the international agreements subscribed by the Republic of Cuba.

According to the enforced national legislation, 10 % of the value of the exportations of wild flora and fauna comes into the National Environment Fund for supporting the conservation and environment management programs.

The National Crocodile programs developed by the National Company for the Protection of the Flora and Fauna also benefits from the contribution of the National Forest Development Fund (FONADEF), for the attention of programs of development and conservation of natural

resources. It also benefits from the contribution of Non Governmental Organizations such as WCS that is supporting research projects on the ecology of *C. acutus* applied to the management of the species, American Zoo and Aquarium Association (AZA) that contributes to the effort of environmental education, the GEF-PNUD project of Strengthening of the National System of Protected Areas.

4.3 Ranching proposal

Initially we propose the Delta del Cauto as the only ranching area. The Zapata swamp wetland, the most extensive of the Caribbean, will be maintained always as *C. acutus* protected area.

Annual monitoring of the nests will be performed in nesting areas of the Delta del Cauto which will be used as calculation base for estimating the annual breeding capacity that will not exceed 40 % of the nests. Within this limit eggs and newborns will be raised. Considering that the estimated minimal annual average of nests is at present of 193 nests (period 1990-2002) and that the amount of eggs per nest maintains an average of approximately 25, the amount of eggs and newborns to be raised will be in the order of 1500 to 2000. This figure will be adjusted every year according to the monitoring results (adaptive management).

The breeding of nests that can be lost due to exposure to adverse conditions of the nesting site (excessive humidity, exposed to effects of waves or tides, high nesting densities) and eggs or newborns of abandoned nests that will be lost if they are not raised, will be prioritized. Breeding of adults, juveniles or others that are not eggs or newborns will not be performed at any time.

The eggs will be incubated in the facilities of the Biological station "Miguel Alvarez del Toro" of the Delta del Cauto Faunal Refuge since it is near to the breeding area and to the Zabalo farm. The method of incubation in outdoors sand beds will be used (with which good results have been obtained in this area and there is sufficient experience in its application), until conditions are created to implement another more technically sophisticated incubation system. The newborns resulting from the incubation of the collected eggs together with the newborns collected directly in the wild area will be marked and transferred to the farms where they will be raised. The Zabalo farm at a short distance from the Biological Station "Miguel Alvarez del Toro" will act as the center of storing and distribution of the animals obtained by ranching. The transfer of the specimens will be performed fulfilling the established in the regulation for transporting live animals and the norms of the Institute of Veterinary Medicine of the Republic of Cuba.

The specimens born in controlled conditions that are in the Sabanalamar and Manzanillo farms or that could be born as a result of the pairing in captivity of the breeders raised in farms, will be considered as specimens raised in farms and they are included in this proposal although in the future breeding in controlled conditions will not be fomented nor will it be extended to other farms. Its objective will be to guarantee a stable production even in years when adverse climatic conditions (i.e. hurricane) oblige to reduce or detain breeding in wildlife (adaptive management) and t6o continue the studies of reproduction biology performed in these farms. The marking system used will allow the clear distinction between the specimens derived from wildlife and those obtained as a result of the reproduction in farm. As a rule they will not be destined to the introduction in wildlife.

All the farms involved in this operation have a zootechnical and veterinary regulations whose strict fulfillment is the responsibility of a biologist and a veterinarian or a veterinary technician.

The sacrifice and slaughter will be performed in adequate rooms with in each farm. These should adjust to the regulations of the Ministry of Public Health and the Institute of Veterinary Medicine of the republic of Cuba. At present these facilities are in the project phase and in the case of the Manzanillo farm it is in the implementation phase.

The sacrifice of the crocodiles will be performed by sectioning the bone marrow at the level of the first cervical vertebrate as is traditional in this activity. It is guaranteed that the manipulation of crocodile meat in all its phases will be performed in a humanitarian way (without cruelty) as recommended in epigraph d) iii) of Resolution Conf. 11.16.

When the studies of the populations and the reintroduction programs allow a breeding level of eggs and newborns in other areas the Republic of Cuba will submit it to the consideration of the Permanent Committee through a well supported proposal. The committee will have the criteria of the Crocodile Specialists Group of SS-INCN and the Faunal Committee for its approval.

Capture will not be performed outside the approved areas and the levels of capture proposed will be strictly fulfilled.

Uniform Marking Method

Live specimens: the specimens obtained by ranching of eggs or newborns which are marked to be immediately returned to the environment, as part of the population dynamics research, as well as those obtained from captive breeding. Until now they have been marked by cutting the shields of the double caudal row according to the numeric pattern. After the approval of this proposal to improve the marking system the option of individual marking of the animals from ranching and farm breeding will be used. The method consists in an adaptation of the system described by Webb (in Messel/Butler, 1977): the first pair of double shields of the tail is considered as point zero; counting from this point towards the end of the tail each segment corresponding to a simple shield represents the thousands on the left and the hundreds on the right. Counting from point zero to the base of the tail each segment corresponding to (or under) a double shield represents the tens on the left and the units on the right. The first pair of shields (point zero) serves to distinguish the specimens captured or born from eggs collected in the wildlife (left side shield) from those born from captive breeding (right side shield). In this system the figures that identify individually each specimen are obtained by performing small surface burns, aided by a welder, on the division line between the scales located directly underneath the corresponding shield to the left or to the right (Figure 8). This marking system does not hurt the animal, complying with what is established in Resolution Conf. 7.12 (Rev.), paragraph a), under recommendation. The specimens that are exported live will be marked with microchips.

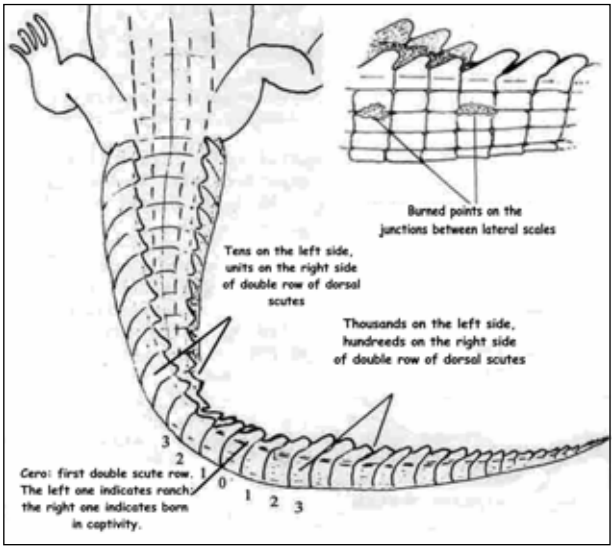

Figure 8. Individual marking system of the specimens (live crocodiles) in the farms (modified from Bolton, 1989).

Farm products

All the products from farm breeding destined to international trade will fulfill the valid system of universal marking to identify crocodile skins (Resolution Conf. 11.12), or other measures that can be approved latter by the parties.

At the moment this proposal was being elaborated there was a population of 7955 live specimens of *C. acutus* in the six farms dedicated to this species all of which are marked

according to the method presently used of cutting the shield in the double caudal row and they are correctly recorded. There is no product (parts or derivatives) stored. The skins of dead animals sacrificed due to sanitary causes or for selling their meat within the country have been incinerated.

The main productions of the farms involved in this proposal are: skins, meat, live animals and souvenir specimens for tourists. The commercialization of other parts or derivatives is not rejected and will be in dependence of the market opportunities.

The crocodile farms that are included in this proposal have been operating without interruption for a minimum of 8 years under the subvention of the Cuban government. In some of them income is obtained from tourist activities and the sale of meat in the local market. These farms have qualified technical personnel (Biologists, Engineers and Veterinarians) and workers experienced in zootechnical manipulation and an adequate infrastructure in constant improvement, at the same time it has established its own reliable source of food based on contracts and in some cases based in productions performed in the farm itself (mainly agriculture and fishing).

4.4 Control measures

The Administrative Authority previous consulting the Scientific Authority, will establish by the corresponding Environmental License (the fulfillment of the national enforced legislation), the annual harvest quotes based on the information of the annual studies. The Inspection Body of the Ministry of Science Technology and Environment and the National Forest Keepers Body of the Interior Ministry will watch for the fulfillment of the quotas and the imposed measures.

The National Company for the Protection of the Flora and Fauna (ENPFF) of the Ministry of Agriculture will be the only authorized entity to perform harvest and breeding no authorization will be granted to particulars or to any other entity for performing this operation thus simplifying the control actions.

Each year at the end of the harvest season the ENPFF will render a report to the Administrative Authority containing the detailed information of the ranching operation as well as the results of the reproduction and breeding in farms. A summary of this report, as well as of the studies and data on commerce will be delivered annually by the CITES Administrative Authority to the CITES Secretariat in annex to the Annual report of the Republic of Cuba of the corresponding year.

All animals will be marked individually and their number will be registered in the record books of each farm that will be kept updated. The CITES Administrative Authority will have permanent access to the books and will receive an updated monthly inventory of each farm. Two years after the approval of this proposal or before if the conditions allow it, an electronic data base of the general inventory will be available.

The CITES Secretariat is invited to visit and examine the farm breeding facilities whenever they like.

All the breeding products destined to international trade will be supported by the corresponding CITES exporting permits which will always refer the mark and seal number.

All the countries of the distribution area of *C. acutus* are Part of CITES and its commercialization is regulated according to this convention.

Assessment of the possible effects of the ranching program

1 As part of the ranching experiment performed in the Delta del Cauto Faunal Refuge between 1987 and 1996 an average of 1400 newborns per year were harvested. This result was within the limits of sustainability and did not affect the stability of the wildlife which maintained a growth tendency.

2 The population was favored by a greater survival of the juveniles, the rapid body growth and high index of recruitment in the breeding category, associated to the resulting reduction in population density. For example between 1994 and 1997 an increase of 111.7 % was observed in the general density of crocodiles in nocturnal counts, and the total number of nests maintained a slight growth tendency.

3 The harvest level proposed (40 % of the nests found per year) is inferior to the number of nests that are lost annually by causes associated to climatic events, behavior of the breeding females and high nesting densities.

4 Nest harvesting performed preferentially in nesting areas with adverse conditions will allow to make use of a number of individuals that otherwise would be lost, favoring at the same time the success of the nests that are left without harvesting by reducing the densities of the nests and with it the causes of nest lost associated to this condition.

5 The reduction of the density of newborns will favor their survival in the natural environment.

6 The resources derived from the commercialization of the farm productions will be dedicated to conservation programs of this and other species.

7 The farm breeding program generates employment sources specially in rural areas and will provide an additional incentive to the conservation of this species.

5. Information on similar species

In Cuba, besides C. acutus, we can find other species belonging to the Order Crocodylia: the Cuban Crocodile (*Crocodylus rhombifer*) and the Small or Spectacled Caiman (*Caiman crocodilus fuscus*).

Today the *C. rhombifer* is only present in two localities of the Cuban archipelago: the Zapata swamp that is the last redoubt of its original distribution and the Lanier swamp, in the Isle of Youth, where it is considered to have extinguished during the first half of the XX century and now it is the object of a reintroduction program by the National Crocodile Program (the responsibility of ENPFF). Although both species have very different habitat preferences in Cuba (*C. acutus* is a typical dweller of the estuaries and mangrove ecosystems and *C. rhombifer* of the interior freshwater swamps), both are in certain grade sympatric and the presence of hybrids in the Zapata swamp is possible (Ramos et al. 1994, 2000). The areas of Zapata and Lanier swamp will not be object of ranching of *C. acutus*.

At present all the exportations of Cuban crocodile skins originate from the only captive breeding operation registered in CITES in the country: the crocodile farm of the Fish Industry Ministry in the Zapata swamp, subject to all the controls recommended by CITES and established by the Cuban State. The skins of both species can be differentiated by the number of transversal rows of ventral scales, the more keeled shields present in the legs and dorsal shields in the margin of the skins of *C. rhombifer* and noticeable differences in coloring of the skins when crude, in crust status or tanned without a dye hiding completely its natural color pattern. The controls and efficient marking system of the products of the crocodile farms contribute to the identification of the specimens.

The other species *Caiman crocodilus fuscus*, is not native of Cuba. It is present in feral status exclusively in the Isle of Youth in natural or artificial freshwater bodies where occasionally one can find specimens of *C. acutus. C.c. fuscus* is listed in the Appendix II of CITES and the referred population is under a harvest control program that is part of the reintroduction program of the Cuban Crocodile. The skins of *C.c. fuscus* are perfectly distinguishable from those of *C. acutus* both by the absence of follicular glands as well as by the presence of osteoderms, size, color pattern and number of transversal rows of the ventral scales.

The present proposal will not bring any negative consequences for the conservation and management of *C. rhombifer* nor can it provoke confusions or replacement, with respect to the management of *Caiman crocodilus fuscus*.

The specimens of C. acutus that do not form part of the ranching program (wildlife outside the localities approved for ranching operations, specimens not belonging to the categories of eggs or newborns in the localities approved for ranching, specimens of zoos, circus or other facilities) will be considered as Appendix I and will be subject to the control regulations established for them. These specimens will be easily distinguishable from the specimens obtained from ranching by the marking and control system of the latter.

6. Other comments

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7. Additional remarks

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Constitución de la República de Cuba.

Evidence of agonistic interactions between females in nesting areas