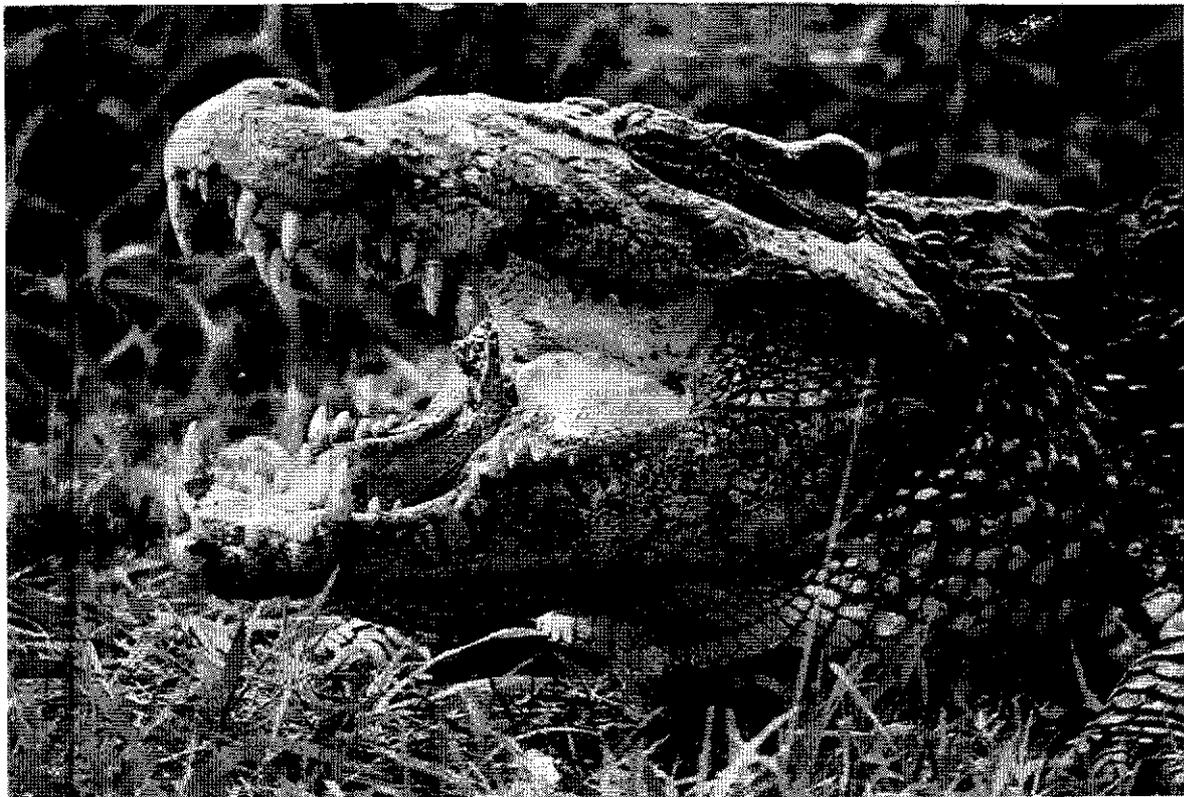


# CROCODILE SPECIALIST GROUP

## NEWSLETTER

VOLUME 18 No. 3 ■ JULY 1999 – SEPTEMBER 1999



IUCN - World Conservation Union ■ Species Survival Commission

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VOLUME 18 Number 3  
JULY 1999 - SEPTEMBER 1999

IUCN--The World Conservation Union  
Species Survival Commission

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COVER PHOTO. Cuba Crocodile *Crocodylus rhombifer*, Cayo Potrero crocodile farm, Isla de Juventud, Cuba. See page 17 for meeting details. R. Soberon Photo.

The CSG NEWSLETTER is produced and distributed by the Crocodile Specialist Group of the Species Survival Commission, IUCN - World Conservation Union. CSG NEWSLETTER provides information on the conservation, status, news and current events concerning crocodylians, and on the activities of the CSG. The NEWSLETTER is distributed to CSG members and, upon request, to other interested individuals and organizations. All subscribers are asked to contribute news and other materials. A voluntary contribution (suggested \$40.00 US per year) is requested from subscribers to defray expenses of producing the NEWSLETTER. All communications should be addressed to: Dr. J. P. Ross, Executive Officer CSG, Florida Museum of Natural History, Gainesville, FL 32611, USA. Fax 1 352 392 9367, E-mail [prosscsg@flmnh.ufl.edu](mailto:prosscsg@flmnh.ufl.edu)

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## EDITORIAL

ANIMAL RIGHTS ADVOCATES CONTINUE DISHONEST CAMPAIGN. It seems like some stories just keep coming around, even though they are ridiculous distortions. The following example was printed in The Sunday Times (UK) in February 1997 and is currently being recirculated on the internet:

*'It took an hour and 41 minutes for the alligator to die, lying in a gutter at an American reptile farm that specializes in such slaughters. The struggling creature was held down to receive seven mighty blows on the back of its head, followed by a three-inch incision in the same spot to allow it slowly to bleed to death. So this two-year-old, 4ft-long animal met its tortured end. Its skin was sold to make handbags for the smartest shops of Europe and the United States.*

*This scene was witnessed by Clifford Warwick, a British scientist and trustee of the Reptile Protection Trust. He has watched thousands of alligators die in the same way. "If you think that is cruel, it's nothing compared to the way most reptiles meet their end," he says. "On a busy day, farmed alligators are simply skinned alive. They can survive like that for two hours."*

A more recent example comes from Colombia: *'Here in Colombia, my organization Latin America Environmental Society based in Holland, is doing an investigation into the illegal trade of iguana eggs (Aguana iguana) and of hicotea (Trachemys scripta callirostris). In Colombia, there is a growing industry of crocodile farming (Caiman crocodilus, locally called babilla). In connection with our investigation, we found out that crocodiles in these farms are slaughtered in a rather inhuman way: a long metal pole is punched through one of the eyes with the view to pierce the concave and reach the brain. As in most cases this does not kill the animal immediately then a blow with another instrument is given behind the head in the neck.*

*We have asked HSI Colombia and Washington for their views and they have kindly forwarded a copy of an article by Clifford Warwick of the Institute of Herpetology, College Gates, Deansway, England, in the Texas Journal of Science - Vol. 42, no 2, 1990.'*

Julian T. Bakker, *Latin American Environmental Society*.

CSG members may also recall an incident in 1996 when members of People for the Ethical Treatment of Animals (PETA) gained entry to an alligator farm under the pretence of being news media and made a sensational video of alligator killing.

It is noteworthy that these attempts to smear the crocodilian farming industry often accompany upturns in the fashion market for crocodilian accessories so perhaps we should take the current outbreak of scurrilous misstatements as good news. It is also notable that the old statements of Clifford Warwick seem to be infinitely recycled, in particular the canard about skinning animals alive. My only thought on this nonsensical statement is, 'Try it!' All my experienced croc and alligator skinner friends agree that the darn things are difficult enough to skin when they are dead and that the idea of skinning them alive is absurd.

Some recent market analyses in the USA suggest that the humane and conservation aspects of purchasing crocodilian products are relatively unimportant to those affluent people who actually purchase the items, these affluent buyers being more sensitive to fashion and price factors. However, the general, non-affluent public certainly can become inflamed against crocodilian products to the detriment of the international trade and our sustainable use conservation programs.

There is little point in arguing directly against the proponents of Animal Rights ideas. They will neither change their minds nor change their campaigns. The best defense is offence, proactively informing the public about the real situation with regard to crocodilian treatment and humane methods. In this regard the industry can be vulnerable if some practitioners keep their animals in obviously harmful circumstances or use improper methods for slaughter. Everyone in the industry and conservation circles should make every effort to ensure that the crocodilians are treated as humanely as possible and that misunderstandings about their condition are corrected.

The Crocodile Specialist Group addressed this issue between 1990 and 1992 by consultation with our veterinarian and physiologist members to clarify the special physiological and neurological properties of

crocodilians and recommend 'best practices' to the industry. These are summarized in Hutton J 1992. Humane Killing of crocodilians. 194-196 In *Crocodiles, Proceedings of the 11th Working Meeting of the CSG, Victoria Falls, Zimbabwe, IUCN- Gland Switzerland*, and the following statement:

Crocodile Specialist Group Statement on Humane Killing of Crocodilians adopted by the Steering Committee 2 August 1992 and published in the CSG Newsletter Vol. 11(3) page 15.

"The IUCN/SSC Crocodile Specialist group re-affirms the necessity that humane methods be used in crocodilian farms and ranches in all instances.

The CSG has previously expressed its concern on this issue following a workshop at the 10th Working Meeting (1990).

The CSG urges the use of the most advanced methods for humane killing of crocodilians and offers the following guidelines:

The CSG recommends that crocodilians be killed by immediate destruction of the brain by either:

- 1) a properly placed bullet from a firearm of suitable caliber or
- 2) by a captive bolt firearm or
- 3) severance of the spinal column followed immediately by pithing by inserting a rod proximally into the brain.

These recommendations have been developed in consultation with veterinarians in the CSG who have actively researched this issue.

CSG recommends that all national and international associations of crocodilian producers disseminate these recommendations and police their members to encourage compliance with these recommendations."

These guidelines are widely applied in the industry and incorporated into humane practice regulations in Australia and the USA. Since then additional technical information has become available. Experiments in South Africa indicate that a '.22 short' bullet fired from a rifle from above and behind the crocodile into the occipital area is effective and the bullet does not

penetrate the length of the skull, and therefore usually does not emerge or ricochet to harm workers or damage the skin. The operator should stand above and behind the crocodile and fire down at an angle of about 45 degrees from a distance of 1.5 - 2 m. A single shot rifle is greatly preferred over a pistol or multiple shot rifle as the process is restricted to one careful shot at a time, but some danger to workers remains possible. Any standard veterinary captive-bolt humane killer of the kind used to dispatch horses, swine etc. is also suitable.

Spinal severance followed immediately by pithing remains the cheapest, simplest and most certain technique and is recommended. For small and medium sized farm raised animals (up to 2 m length) the spinal cord is severed directly behind the skull with a hatchet or chisel (a machete is too wide and not suitable). A very effective method is to take a large wide chisel and with a mallet drive the chisel through the spine. In some farms they weld a short rod across the chisel to prevent penetration through to the ventral throat where it would damage the skin. Immediately after cutting the spine, a metal rod is inserted into the brain cavity and the brain is completely destroyed almost instantaneously. This second step is necessary as merely cutting the spine immobilizes the animal but does not immediately kill it. The process takes a long time to describe, but it is very quick. A skilled operator can kill a medium size crocodile humanely in seconds without any fuss or danger. The method is humane, low-tech, cheap, very effective and safe for workers. It also ensures that the skulls are undamaged and can be sold as curios to tourists for extra income- it is the method of choice on most farms.

The persistent reflex and muscle twitching shown by reptiles after complete destruction of the higher brain centers can cause a distressing appearance of being alive. This can be reduced significantly by hanging carcasses in a cooler before skinning, a procedure that also aides exsanguination to improve meat quality.

By adopting humane practice and promulgating guidelines such as these the industry protects itself from ill informed criticism and sustainable use programs can continue to prosper. -- Perran Ross, *Executive Officer CSG*.

ERRATUM. Two line item headings were inadvertently left off the financial report published in the last issue. To avoid any misunderstanding, the report is reprinted here with the omitted headings in bold.

HALF YEAR FINANCIAL REPORT JAN - JUNE 1999  
30 June 1999

Summary

Balance at 1 Jan 1999	21,921.21
General Revenues	49,851.76
General operating expenses.	-32,268.73
Special project revenue (1)	4,000.00
Special project expenses	-104.94
Balance at 30 Jun 1999	43,399.30

Detail

General revenue	
Donations (unrestricted) (2)	42,283.00
Sales (Publications)	3,712.50
Misc. & News subs	3,856.26

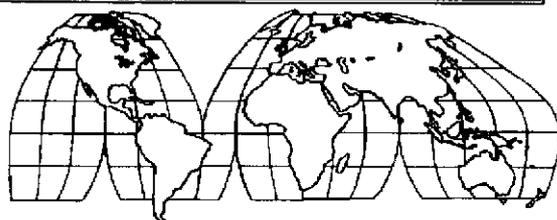
General Expenses

Staff (3)	18,245.00
Fees for Services (4)	1,280.00
Printing and Copying	5,629.04
Other publication	280.00
Repair	82.00
Supplies	476.97
Phone & Fax	289.00
Mail & Newsletter	3,577.54
travel expenses	630.52
<b>Bank Charges and fees</b>	1,163.82
<b>Miscellaneous</b>	614.84
<b>Total Operations</b>	<b>32,268.73</b>



*C. acutus*, San Pedro Sula crocodile farm, Honduras. E. Fernandez photo.

## AREA REPORTS



### AFRICA

#### Nigeria

CROCODILE STATUS AND DISTRIBUTION IN SOUTH EASTERN NIGERIA: *OSTEOLEAMUS TETRASPIS*. In the recent IUCN Action Plan for crocodiles, 1998, it is mentioned that assessing the status of crocodiles in west Africa in general, and in Nigeria in particular (see pages 36 and 68), is one of the priority plans for international crocodile conservation. The body of information available on the status and distribution of Nigerian crocodiles came essentially from the pioneering studies of M.P.O. Dore in the early '90s (Dore, 1991. CSG Newsletter 10 (3): 5-6; Dore, 1996. CSG Newsletter 15 (2): 15-16; Dore, undated. "Status of Crocodiles in Nigeria", report to Flora and Fauna Preservation Society, 45pp.). Dore's surveys were intermittently conducted all over the main climatic zones of Nigeria, and showed that one species was critically endangered if still extant in the wild (*Crocodylus cataphractus*), one was rare and endangered but widely distributed (*Crocodylus niloticus*), and one was locally abundant but with restricted distribution (*Osteolaemus tetraspis*).

Since 1996, we have been involved in long-term ecological studies of Nigerian reptile faunas. Although our main research has been on the projects (1) "Autoecology and synecology of forest snakes" and (2) "The culturally conserved or protected reptiles of Nigeria", during our surveys we were able to collect a lot of ecological and distribution data on crocodiles (e.g. see Akani *et al.*, 1998a. Bull. Soc. Herp. France 87/88: 35-43; Luiselli *et al.*, 1999. J. Zool. London 247: 127-131). Here we report an updated synopsis of our data on distribution and status of crocodiles in the rainforests and mangrove coastal forests of southeastern Nigeria.

The territory surveyed extends from the Niger River to the political border between Nigeria and Cameroon, and includes the following states: Bayelsa, Rivers, Abia, Akwa-Ibom, and Cross River. The main habitats are swamp freshwater forests, forest-plantation mosaics, and coastal mangrove forests, especially in the surrounding of Port Harcourt city. The surveyed area is under heavy anthropic pressure. Oil and Gas companies (ENI Group, Snamprogetti S.p.A., T.S.K.J. Nigeria Ltd), and Environmental institutions (Aquater S.p.A., Demetra S.r.l., Ecosystem S.r.l.) financially supported our expensive trips.

To survey crocodile distribution and status, we used a combination of (i) interviews, (ii) day time river cruises (prolonged for hundreds of kilometers throughout the creeks, lagoons, and river mosaics of this part of Nigeria), and (iii) bush-meat market surveys (Akani *et al.*, 1998b. *Anthropozoologica* 27: 21-26). Night river cruises are logistically difficult in this part of Nigeria, and were done very rarely. At this time we are in the process of preparing detailed distribution maps for the three crocodile species, plotting both the ascertained localities of presence and the suspected ones (i.e. those where the presence of a given species was testified by local hunters, but not ascertained by our visual records).

Our surveys demonstrated that the Niger Delta region is the most important one for crocodile conservation. Extended for over 20,000 km<sup>2</sup>, the Niger Delta region is the largest wet area of west Africa, and consequently should be a main territory of investigation for crocodilian biologists and conservationists. Indeed, this region is still inhabited by all the three crocodile species (Akani *et al.*, 1998a), but it is the main oil producing area of sub-Saharan Africa, and is consequently strongly developed with catastrophic effects on its wildlife, including crocodilians. Two other important areas are the Kwo Ibo (=Qua-Ibo) River banks and swamp-forests in Akwa-Ibom State, and the Cross River and Calabar River system in Cross River State. The widely deforested areas interspersed between the forest blocks of eastern Niger Delta and Cross River State (e.g. in the surroundings of Aba, in Abia State) are of lesser importance for crocodile conservation, and the crocodile populations are very depauperated (only *Osteolaemus tetraspis* is present there).

*O. tetraspis* is no doubt the most common crocodile of southeastern Nigeria. This species was frequently observed in the freshwater swamp forest and along the main creeks of Bayelsa and Rivers States (e.g. Ekole Creek, Kolo Creek, Taylors Creek, and Orashi River, approximately from the latitude of the town "Ogbia" to the town "Oguta"). Along the courses of Taylors Creek and Orashi River (two areas which are in part officially protected) it appeared very abundant. This species is still locally

abundant along the banks of the rivers Sambreiro, Otamiri, Imo, and Kwo Ibo, which run throughout widely deforested areas. The dwarf crocodile is also abundant in the Cross River - Calabar River system, including several sites along the Great Kwa River, Emi River, and their tributaries. *O. tetraspis* was generally not found in the coastal mangrove formations, but isolated specimens were observed even in this type of habitat (e.g. "Peterside", in front of Bonny Island, Rivers State).

Our surveys confirmed Dore's observations that dwarf crocodiles are by far the most traded crocodile species of southern Nigeria. We can also state that no other reptile species, including monitors, *Varanus niloticus ornatus* and pythons, *Python sebae*, are subjected to comparable hunting pressure with that of dwarf crocodiles. Dwarf crocodiles are offered as food in bush-meat markets, and their leather is also widespread in towns and villages. The quality of *Osteolaemus* leather is reportedly low (Ross, 1998), but it seems that Nigerians continue to widely use this type of leather.

Considering that it is very easy to find dead dwarf crocodiles for sale, it is also very easy for the biologists to collect ecological data on this poorly known species by simply measuring and dissecting these offered (already killed) specimens. For instance, by means of careful

analyses of these traded specimens, it has been possible to learn more about the numbers of eggs produced by wild females, the reproductive



*Osteolaemus tetraspis*, bushmeat market, Gabon. O Behra photo.

timing, and the diet of *Osteolaemus tetraspis*, without sacrificing any further specimen (Akani *et al.*, 1998a; Luiselli *et al.*, 1999).

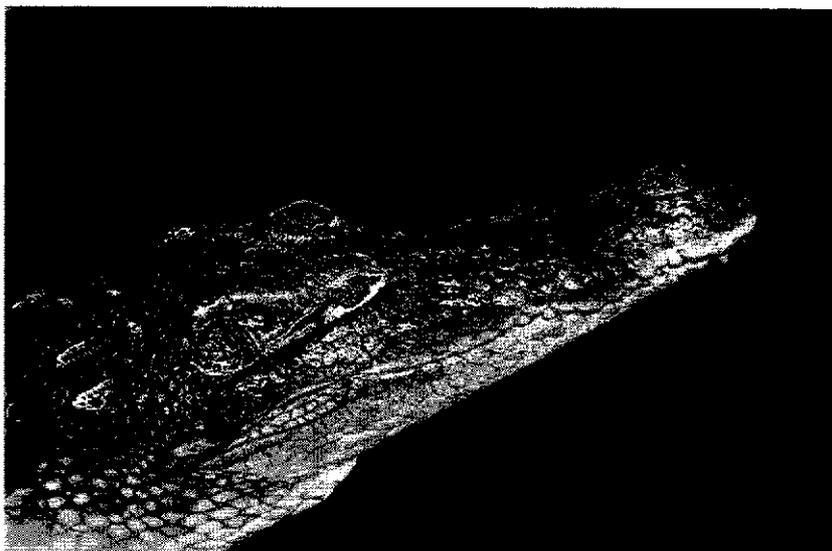
Dwarf crocodiles are well-known in virtually every town and village of southeastern Nigeria. Although they assume a lot of local names (e.g. "Oba" among Igbos, "Sibiri" among Ijaws, "ofiom-inyang" among Efiks, and "ofiom" among Akwa-Iboms), they are always called "alligators" by english-speaking people.

Dwarf crocodiles are no doubt vulnerable on the whole of southeastern Nigeria because of the terrible hunting pressure they have been sustaining since a number of years, and are locally even threatened in those sites where habitat destruction is going on. However, there are still wide forested areas (e.g. in Niger Delta) which can sustain large populations of this crocodile species. We are led to think that the creation of a *Osteolaemus*-oriented mosaic of protected areas could be a good preservation measure for this reptile, and we are presently trying to elaborate a rationale for such a specifically oriented mosaic of protected areas.

- Luca Luiselli, F.I.Z.V., via Olona 7, I-00198 Rome, Italy, and Demetra S.r.l. [lucalui@iol.it](mailto:lucalui@iol.it), Edoardo Politano, Aquater S.p.A., via Miralbello 53, I-61047 S. Lorenzo in Campo (PS), Italy and Demetra S.r.l., via Rossini 15A, I-61032 Fano (PS), Italy [demetr@tin.it](mailto:demetr@tin.it), and Godfrey C. Akani,

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*C. niloticus*, captive. Europe R. Sommerlad photo.

## East Asia, Oceania & Australia

### China

GUANGDONG CROCODILE RESEARCH INSTITUTE. Guangdong is one of the provinces with the most species and numbers of commercial captive facilities for crocodiles in China. The crocodiles have been bred in various areas, mainly for tourism viewing purposes. In the hot summer, thousands of crocodiles can be spotted by the riverbank, sunning and sleeping in the shadow of the trees or swimming in the river. This is a good view of breeding economic crocodiles in China.

Recently, with the permission of the related ministry, a crocodile research institute was set up in Zhao Qing, Guangdong with our help. Professor Huang Chu Chien made this updated progress since the start of his studying crocodile in the mid-1950's. Mr Wei Huan from Guangdong and Ms. Yuli Tan from Hong Kong are the standing leaders of this institute. -- Huang Chu Chien, *Institute of Zoology,*

### Indonesia

MONITORING CROCODILES IN IRIAN JAYA. The people of Indonesia have historically used crocodiles for a variety of non-commercial purposes. In the last 10 years, commercial collection of crocodiles has increased and may become a threat to the population status of Indonesian crocodiles. As pressure from commercial hunting continues, the successful conservation of Indonesian crocodiles will depend upon monitoring

the populations in the wild. Irian Jaya is one of several islands in Indonesia that has a substantial but unknown number of crocodiles and supports regulated harvest for commercial use, as well as removal of stock for farms.

Crocodile populations have been monitored in Irian Jaya at Kaimana and Arguni Bay since 1990 with surveys conducted each year to 1994 and in 1996. No surveys were conducted in 1995 and 1997 and the most recent survey was conducted in 1998. Earlier surveys conducted during the FAO crocodile development project in 1988 and 1989 do not have survey distances recorded and therefore cannot be used to compare with current data.

Surveys conducted since 1990 were located on 5 rivers (Barusa R., Kamabu R., Garawa R., Buruai R., Gasawi R.) and Suwiki Lake and covered a total distance between 37 km and 58.5 km. In 1998 we surveyed 107.5 km including the sections covered in earlier surveys. Surveys were conducted between 15 and 24 December 1998. Following Messel *et al.* 1981, a halogen light of 7.2 V was used to locate crocodile eyeshines and crocodiles approached where possible to estimate total length. Most crocodiles observed were identified as *C. porosus*, known locally as Buaya Muara. Observed animals were classified as 'Hatchlings' < 50 cm TL, 'Juvenile' 50 - 150 cm TL and

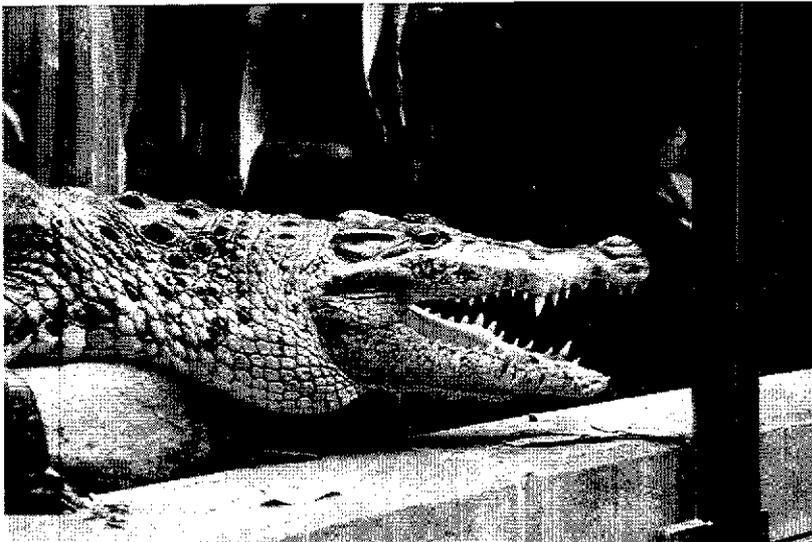
'Adult' >150 cm TL or 'Eyes Only' if size could not be estimated. Survey distances were calculated from 1: 100,000 scale maps and all located between 03° S- 04° S Lat. and 133° E - 134° E Long. Surveys on larger rivers (Buruai and Gasawi) were conducted from a long boat powered with a 25 hp engine and on the remaining smaller rivers by canoe.

A total of 116 crocodiles were recorded including 6 *C. novaeguineae* on the Gasawi River.

River	Survey km	Density
Barusa	5	0.80
Gasawi	39	0.36
Gasawi	39	0.40 *
Buruai	47	0.13
Garawa	1.5	1.33
Kamabu	2	1.00
L. Suwaki	13	6.31

\* *C. novaeguineae*

Comparison of 1998 data with survey data from previous years using regression analysis allowed an interpretation of crocodile population trends. Lake Suwaki showed a statistically



*C. novaeguineae*, male Wuppertal Zoo, Germany. R. Sommerlad photo.

significant increase in density from 0.92 in 1990 to 6.31 and also has a significantly higher density of crocodiles than the rivers surveyed. The rivers, with overall lower densities, show small decreases or fluctuations over time but these are not statistically significant. The

relatively low densities and fluctuating or declining trends in the rivers may reflect the continuing effect of harvesting. Closure to hunting and continued monitoring is recommended for these rivers. This work was funded by the Indonesian Crocodile Farmers Association in collaboration with the Indonesian Institute of Sciences. -- From DRAFT SURVEY REPORT, JANUARY 1999. Hellen Kurniati. Research and Development Center for Biology, Indonesia Institute of Science (LIPI), Widiasatwaloka Building, Jln. Raya Jakarta-Bogor km 46, Cibinong 16911 Java, Indonesia and Yunus Rumberar, Sub-Div. Natural Resources Conservation Irian Jaya, Department of Forestry and Plantation (PIIPA) Jln. Jend. Sudirman 40, Sorong, Irian Jaya, Indonesia.

## Myanmar

STATUS OF ESTUARINE CROCODILES IN THE SOUTHERN AYEYARWADY DELTA. Myanmar is the largest country in Southeast Asia. While historical information suggests that turtles and crocodiles were at one time widespread and relatively common, all available evidence suggests that now both these groups are severely

depleted. As a first step to assess the situation of turtles and crocodilians in Myanmar we carried out an ecological reconnaissance of the southern delta region of the Ayeyarwady (formerly spelled Irrawaddy) River. The work was carried out through the Wildlife Conservation Society Myanmar office working in conjunction with the Myanmar Forest Department. Logistical support was provided by the Meinmahla Kyun Wildlife Sanctuary and the Fisheries Department. We also worked with Dr. Win

Maung and two students from Yangon University.

The Ayeyarwady drains a large portion of Myanmar's northern and central regions. Approximately 90km from the ocean it splits into myriad channels that drain to the Andaman

Sea and Bay of Bengal. Among the largest of these is the Bogale River, which near its mouth, divides to form the island of Meinmahla Kyun. The region's climate is tropical monsoon with heavy rains concentrated between June and August. The delta has a high human population density of 170/km<sup>2</sup> and the principal activities in the region are rice farming, fishing and cultivation of Nipa palm, betel nut and coconut. In the southern delta mangroves are the predominant vegetation but have been significantly degraded by cutting for fuel and conversion to rice paddies.

Our survey concentrated on the Meinmahla Kyun Wildlife Sanctuary (MKWS) a 136 km<sup>2</sup> island in the lower Bogale River. MKWS was declared a Reserved Forest in 1895 and a Wildlife Sanctuary in 1994. A combination of daylight surveys and nocturnal spotlight counts were used. Surveys were conducted from 8 m long wooden boats powered with long shaft diesel outboard motors. Potential survey routes were traversed during the day to assess navigability and search for basking crocodiles, tracks and slides. At night crocodiles were located with a 400,000 candlepower spotlight or battery powered headlights. Tidal amplitude in this region is 2- 2.5 m and counts were timed to coincide with a period of approximately 2 hours before low tide to one hour after. Crocodiles were approached and identified by size class as juveniles (TL < 120 cm), subadults (TL 120-200 cm) or adults (TL > 200 cm) or as 'Eyes Only' when size could not be determined. Survey endpoints were located with a hand held Global Positioning System. Habitats were stratified by vegetation type and creek width to allow interpretation of crocodile densities. Attempts were made to resurvey the area previously visited by Graham Caughley in 1980.

We conducted 456.9 km of day surveys and 275.4 km of night surveys along the rivers and creeks in MKWS and the adjacent Pyindaye and Kadonkani Reserved Forests. A total of 61 crocodiles were seen during 16 night surveys with an overall encounter rate of 0.221/km. We replicated surveys along an 11.4 km section of Thabye Creek to estimate the sighting fraction and converted survey densities to total population size and 95% confidence limits using the equations of King *et al.* 1990 and Messel *et al.* 1981. From these we estimated the number of adult crocodiles in the MKWS at no more

than 10 individuals and the total non-hatchling population at no more than 100.

Crocodiles tend to nest in the same area year after year and these locations are a closely guarded secret by those who made a living collecting hatchlings for farming programs in 1980's and early 1990's. One recent nest was reported by Fisheries personnel on MKWS and the presence of hatchlings suggests additional nesting. Three other nests were recently reported in the area outside MKWS.

The loss of mangrove habitat has been one of the most important factors influencing the decline in crocodiles and other wildlife in the region. The Forestry Department estimates that mangrove forest left in 1995 was 17% of 1925 levels and is highly degraded. A 10,900 ha swath was converted into rice fields in the 1980's by the Myanmar Irrigation Department with funds from the World Bank and creek banks in the Pyindaye Reserved Forest were diked. Compounding the problem of habitat loss is intense fishing. Fixed and floating gill nets are widely employed.

Exploitation of crocodiles dates from the early 20<sup>th</sup> century when a bounty was offered for crocodiles and their nests. Commercial hunting began in the 1950's and continued up to 1994 when the Sanctuary was declared. Local residents informed us that meat was sold in local markets and skins were sent to Yangon and Mawlamyaing and exported to Thailand and Singapore. In addition to hunting, the collection of juvenile crocodiles to supply commercial farms (ranches) may have had a significant impact. Capture of juveniles was organized in the mid-1970's and operated at a high and efficient level until 1995. Caughley (1980) considered that nearly 100% of hatchlings from the Pyindaye RF were taken to the farm. In addition to legal collection, an illegal market providing live juveniles for crocodile farms outside Myanmar developed. Local residents reports that Thai fishing boats purchased live juvenile and adult crocodiles. A military post established in 1993 near the mouth of the Bogale river has curtailed this illegal trade.

Myanmar has a long history of wildlife protection. A new Protection of Wildlife and Protected areas law of 1994 provides substantial protection to crocodiles with large penalties for violations. In addition to wildlife protection, the staff of MKWS began a small crocodile headstarting program in 1995 and the program,

modeled on work in India, is designed to speed crocodile population recovery. To date 140 eggs and hatchlings have been collected from the wild and 41 of these released. 55 remain in captivity, including 25 from the most recent year of collection but these appeared emaciated and weak and have low growth rates. An analysis of husbandry problems and some recommended solutions were developed during the survey.

When Caughley surveyed the area nearly 20 years ago crocodile populations had already been severely depleted. Based on his surveys and estimates of the amount of habitat he made a much-cited estimate of 4,000 crocodiles for the region. Our surveys reveal similar encounter rates (0.122/km versus 0.132/km) but crocodiles appear absent or greatly reduced everywhere except within the Wildlife Sanctuary. The crocodiles we observed represent the last vestige of a formerly widespread population. In the context of the past and continuing habitat loss the situation is alarming. However, the presence of a small number of nesting females, the recent declaration of MKWS and the initiation of a headstarting program give cause for hope. During our surveys we observed juvenile crocodiles and the habitat in MKWS appears suitable to support a viable crocodile population if allowed to recover. We conclude that crocodile populations in the unprotected reserved forests have virtually disappeared but the number of animals in Meinmahla Kyun is beginning a slow period of recovery. -- *Extracted from ECOLOGICAL RECONNAISSANCE OF MEINMAHLA KYUN WILDLIFE SANCTUARY AND VICINITY, SOUTHERN AYEYARWADY DELTA, MYANMAR. Wildlife Conservation Society 1999. John Thorbjarnarson, Steven G. Platt and Saw Tun Khaing., The Wildlife Conservation Society, 185<sup>th</sup> St. and Southern Blvd., Bronx, NY 10460-1099, USA.*

## LATIN AMERICA

### **Colombia**

ECOLOGY OF THE ORINOCO CROCODILE. Some behavioral and ecological aspects were observed in a remaining population of *Crocodylus intermedius* found in the Colombian region of Arauca, in the Cravo Norte, Ele, Lipa, Casanare and Cano Matopalma rivers. These studies were

conducted on both captive and wild crocodiles. *Ad libitum* observations were made and compiled for basking and heating behavior, nest care, parental care of groups of hatchlings and behavior of the hatchlings. Observations were made during the dry season in 1994 and 1995.

Basking behavior during daily activity was different among the adult animals studied. Crocodiles appeared to respond to the presence of humans by remaining in and beneath the water, although tracks indicate their presence on land when no people are present.

Seven areas of nesting were located on sandy beaches and banks of several of the rivers surveyed. Some of these were on short and steeply sloped sections of eroded banks of rivers. We estimate that six breeding groups totaling no more than nine adult females are found in this region. Clutch size was 20 -34 eggs. Nesting took place from late December to mid January. Eggs hatched from mid March to the beginning of April prior to the first rains of the rainy season and the seasonal rise in river levels. Large excavations of nests found after hatching suggest that the females open the nest when the young are merging. Females also remained near the nests and visited them frequently at night during the incubation period.

On two occasions we came across groups of hatchlings located within 100 m of recently hatched nests and these appeared to be accompanied by an adult crocodile. However, these adults are very wary and remain out of sight when observers are near. The hatchlings were located together under vegetation extending from the bank. They appeared to separate during the night and reunite during the day. Hatchlings were also observed locating themselves in sunlight patches during the day. Hatchlings vocalized when approached by humans.

People are a significant mortality factor for crocodiles in this small remnant population. Adults are caught in fishing nets and sometimes deliberately killed for local commerce in skulls, skins feet and fat. We recorded 7 adults killed in this region between 1985 and 1995. Eggs are collected by local people and hatchlings are collected and sold, particularly in the town of Cravo Norte. Deforestation has permanently opened access and reduced cover for crocodiles and also contributes to problems of sedimentation that can possibly affect available food and therefore reproduction of this small

population. These locations are also increasingly impacted by local fishermen and tourists who disturb the natural behavior of the crocodiles.

This relict population of *C. intermedius* is distributed in small reproductive groups during the spring months. While the habitat remains suitable for the conservation of the species, the presence of people negatively affects the crocodiles causing a danger to the survival of this small population. -- *Extracted and freely translated from* Bonilla C. Olga Patricia & Sandra L Barahona B. 1999. *ASPECTOS ECOLOGICOS DEL CAIMAN LLANERO (CROCODYLUS INTERMEDIUS GRAVES 1819) EN UN SUBAREAL DE DISTRIBUCION EN EL DEPARTAMENTO DE ARAUCA (COLOMBIA). Revista del Academia Colombiana de Ciencias Exactas, Fisicas y naturales. Vol XVIII. No. 86:40- 48.*

## Paraguay

ROUND TABLE ON CROCODYLIAN CONSERVATION. In conjunction with the 4<sup>th</sup> International Conference of Wildlife Management in the Amazon and South America, attending members of the CSG held a round table discussion of regional crocodilian management, coordinated by Alejandro Larricra. Speakers were Alvaro Velasco; Jaime Ramirez; Tereca Q. Melo; Aida Luz Aquino and Oscar Rendón. The objectives were to evaluate the different management alternatives for the crocodiles in Latin America; discuss the mechanisms to improve the operation of the dynamic complex: Natural Resources/ Human Resources / Economics/ Politics and to produce basic recommendations to stimulate the development of the sustainable use programs in the region.

The sessions began with a characterization of the historical relationship between the crocodiles and human beings. Then a description of the three general management alternatives for crocodiles was offered (Farming, Ranching and Cropping), taking into account the situation of the Latin American species on one hand, and the situation of the international market on the other. Finally the debate opened up with all the participants, producing a rich exchange of experiences, and beginning the solution to some of the chronic problems of communication in the region.

Although still needing much work to reverse setbacks, the situation is experiencing a constant improvement due to the development of the human resources in the region.

The meeting made the following recommendations for crocodilian conservation:

To take advantage of the experience of the advanced countries in the implementation of sustainable use programs, but adapt the management to each local situation.

To stimulate the creation of new channels of communication, between both the national and international scientific community, and with the political and administrative authorities of the countries of the region.

To stimulate the formation of human resources such as scientists, and regional technicians.

To advance in the study and public education to develop conservation programs for species without immediate possibilities of commercial use.

To advance in the study and in the public education to find alternatives of sustainable use of the wetlands, since it is always uncertain to depend on the international fashion market in order to sustain the programs. -- Alejandro Larricra, *Vice Chairman for Latin America, By. Pellegrini 3100, (3000) Santa Fe, Argentina. [yacare@arnet.com.ar](mailto:yacare@arnet.com.ar).*

## Peru

WORKSHOP ON CROCODYLIAN MANAGEMENT. The International Aquaculture Symposium, 'Projections for the New Millenium', was organized by the Peruvian Fisheries agency FONDEPESCA, 22 - 24 September 1999. As part of the Symposium a Workshop was organized on 'Rational Use of Crocodiles and Caimans'. This workshop was attended by Alejandro Larricra and Alvaro Velasco, Vice Chairman and Deputy Vice Chairman for the region, and CSG member Alfredo Arteaga, as well as several Peruvian crocodile researchers.

The workshop was a fruitful exchange of experiences and opinions that summarize the philosophy of the Sustainable Use today at world level. In a first section three general reports were presented on management of crocodiles: *Caiman crocodilus* cropping in Venezuela, the harvest of wild eggs for ranching of *Caiman*

*latirostris* of Argentina, and the caiman farming programs of Colombia. Also from Venezuela the conservation work on the recovery of *Crocodylus acutus* populations was presented. After these presentations, which were broadly debated, the presentations were made on the current activities developed in Peru. The meticulous population studies on the situation of the Tumbes crocodile were described. In addition there has been a constructive experience with the FONDEPES farm in Tumbes that has been refocused as a center of crocodile production for population recovery in the region in the future. Lastly, the experience of Iquitos pilot project for caiman farming, concluded that years of work have provided useful training in techniques and the potential for *Melanosuchus niger* for ranching operations. It was demonstrated that the FONDEPES has full capacity to take a program of intensive breeding of animals, starting from the crop of wild eggs.

The following recommendations were made:

**Tumbes Crocodiles:** A program of population recovery is the only option, since it is clear that *Crocodylus acutus* there is on the verge of disappearance. It is recommended to optimize the function of the excellent facilities, to maintain the current breeding stock; and to continue with the populational studies in the region to maintain effective monitoring and to identify the best places for the future crocodile releasing.

**Caiman *crocodilus*:** Neither breeding in captivity nor their management for ranching is recommended since both practices are very expensive, taking into account the low price in the international market. It was recommended to evaluate of their population situation for the development of a program of direct cropping (hunt), following the example of the Venezuelan program.

**Black caiman:** Their breeding was not recommended in captivity, although the ranching of this species appears a feasible alternative, since its recognized quality guarantees good prices in the market. For the present it is recommended to carry out population studies to identify the nesting areas and the population's situation in nature that eventually might support a proposal to change from Appendix I to II of CITES. In this case, if FONDEPES is involved as a ranching station for artificial incubation and for rearing of the

hatchlings of the eggs harvested in the wild, our opinion was that in the medium term it will be in the situation of producing thousands of animals a year. This would support the exploitation of caimans on the basis of a Sustainable Use program, widely accepted by the scientific community and most of the NGO's. Acknowledgement is gratefully made to all of FONDEPES, but specially to the president Arq: Julio Baba Nakao, and also to Lic. Violeta Valdivieso for organizing this valuable session. -  
- Alejandro Larriera. *Vice Chairman for Latin America, Bv. Pellegrini 3100, (3000) Santa Fe, Argentina.* [yacare@arnet.com.ar](mailto:yacare@arnet.com.ar)

## MESO - AMERICA

### **Jamaica**

**WOMAN, 70, KILLED BY CROCODILE IN JAMAICA.** An elderly woman fishing on the banks of Jamaica's longest river was killed when a crocodile pulled her into the water, police said Friday.

Linda Atkinson, 70, the owner of a shop and bar in southwestern Jamaica, was swept into the Black River Wednesday by a crocodile witnesses described as about 10 feet (3 meters) long. Fishermen wrestled her away from the crocodile but she was pronounced dead at a hospital, police said.

The incident angered residents in the area, who say crocodiles in the Black River are dangerous and should be killed. They are a protected species and a major attraction for tourists on the scenic river.-- KINGSTON, Jamaica (Reuters) -

## NORTH AMERICA

### **Mexico**

**ECOLOGY AND USE OF MORELET'S CROCODILE.** The central coast of Quintana Roo, Mexico has wetlands that provide important wildlife habitat. To protect these wetlands and other habitats the Mexican government established Sian Ka'an Biosphere Reserve (528,147 ha) in 1986. If local people are not interested and involved,

conservation efforts in Sian Ka'an will not be successful. If wetlands can provide some benefits to people, local communities will have more interest in participating in their protection. In wetlands the crocodile is probably the most economically important resource. Morelet's crocodile (*Crocodylus moreletii*) can be used for ecotourism and for selling skins and meat. However, Morelet's crocodile is considered rare by Mexican law and listed on Appendix I of CITES. To initiate a sustainable Morelet's crocodile harvest program it is necessary to know its population ecology. Then, it would be possible to evaluate the feasibility of a harvest and facilitate obtaining certificates from the Mexican government and CITES to trade crocodile products.

The population of crocodiles in Sian Ka'an has been under long term study and survey since 1990. To estimate the population size a capture-recapture survey was implemented between 1993 and 1996 in northern Sian Ka'an. The field work was concentrated on three lagoons and a surrounding network of canals. Surveys and captures were conducted twice weekly along eight routes totaling 52.5 km. Crocodiles were located with a spotlight, captured by hand or a noose, measured, marked and released in situ. Three different marking systems were used: numbered metal cattle ear tags, numbered metallic clips and cutting tail scutes. Other parameters such as weather, water depth, temperature, time and moon phase were recorded. Every season, nests of Morelet's crocodile were located in the study area and the number of eggs was determined during the first study season. Population estimates were generated with a geometric estimator of the capture frequency model following Edwards and Eberhardt 1967, Seber 1973 and Caughly 1978. These generated an estimate of between 556 and 705 individuals in the study area.

I applied the Bertalanffy growth model to calculate age of crocodiles based on total length. I then estimated population age structure, constructed a static life table, and used the survival and fertility rates of each age class to project a Leslie matrix model of the dynamics of the population.

The first age class represents 48% of the population, which has an intrinsic rate of increase of  $r = -0.00003$ . This population model was then used to evaluate nine harvesting and restocking scenarios. Harvesting adult

crocodiles is not feasible in Sian Ka'an. The population model suggests that the implementation of a ranching system where about 50% of wild produced eggs and 75% of hatchlings can be collected and raised until they reach commercial size. About 30% of collected individuals must be restocked (released to the wild) after 3 years. Production would depend upon the wild population so that producers would be concerned about the population and its habitat. Local community participation will be an essential factor in developing a useful project. -- Summarized from Merediz-Alonso G. 1999. *Masters Thesis, State University of New York Syracuse, New York, USA.*

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MIXED NEWS FOR CANCUN CROCS. The Bad News: In July a 1.5 m croc was found dead in the Nichupté Lagoon in Cancun presumably killed by smashing large rocks on its head. The body was already decomposing and was reported by a student at the El Eden Crocodile management course PROFEPA in charge of wildlife enforcement. This is the third definitive record of a crocodile killed in Cancun this year.

The Good News: After more than a year of struggle I finally have some funds to initiate the Management Program for Crocodiles in Cancun. This will involve Training of Personnel, Public Education, Research & Monitoring of Croc Populations, Development of Legislation-Regulations and Removal of Problem-Nuisance-Crocodiles. It is hoped that this program will address the continuing problems of human-crocodile interactions at this popular tourist resort and mitigate the negative effects on the crocodile population. -- Marco Lazcano B. *Amigos de Sian Ka'an A.C., Ave. Coba 5 entre Nube y Brisa, Plaza America Locales 48-50, 2 piso. Supermanzana 4, Cancun, Quintana Roo, 77500 Mexico.*

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MEETING INAUGURATES NEW MANAGEMENT COMMITTEE. In a meeting in Mexico City, 22 September 1999, representatives of Federal and State government agencies, academics, non-governmental organizations, the private sector and the Sociedad para el Estudio y Conservacion de los Cocodrilos en Mexico (SECOCOM) met to establish a technical consulting subcommittee for the conservation, management and sustainable use of Mexican crocodiles. The new

subcommittee, with the acronym COMACROM, is established to be advisory to the Director General of Wildlife on all matters pertaining to crocodilian conservation. This follows standard government practice to structure broad input into natural resource management in Mexico.

At its inaugural meeting the subcommittee, convened by Jose Juan Perez Ramirez on behalf of the DG Wildlife, identified suitable members and discussed its bylaws and operating procedures and planned out its development for the immediate future. The subcommittee also conducted an extensive examination and discussion of the draft proposal to down list the Mexican population of *Crocodylus moreletii* from CITES Appendix I to Appendix II, currently in preparation in Mexico. The technical and biological background to the proposal was examined and the conceptual approach for regulated crocodile use in Mexico discussed. It is expected that this subcommittee will provide an access channel to the Federal Regulating agency and CITES Management Authority for recommendations regarding crocodilian conservation. The Committee has strong representation from Mexican CSG members as well as from the national crocodilian conservation Society SECOCOM.

In the two days following this meeting, a general meeting of Mexican crocodilian biologists was held at the Instituto de Ecologia headquarters with about 40 participants from around the country. A series of presentations on recent results and updates of on-going projects gave further evidence of the active nature of crocodilian research in Mexico. The Group then discussed a series of national and regional issues including the new COMACROM Sub committee; recent activities of SECOCOM, including their latest Newsletter; the CITES proposal; a Mexican response to the current initiative to coordinate activities in the region through a Meso American Association and the plans for a coordinated series of presentations at the CSG Meeting in Cuba next year.

I attended both meetings as liaison for CSG and to advise on forward progress of crocodilian conservation in Mexico. I continue to be deeply impressed with the broad diversity, energy and vigor of crocodilian research and conservation in Mexico. Communicating the results of these activities will allow the rest of the world crocodile conservation community to appreciate the very rapid developments and excellent

accomplishments of this national program that combines academics and students, private and commercial interests and the government sector. Travel to the meeting was supported by a special travel grant from World Wildlife Fund - US -- Perran Ross, *Executive Officer CSG*.

## USA

**COLORADO ALLIGATORS.** An alligator farm in the Rocky Mountains of Colorado? Erwin Young of the Colorado Alligator Farm in the San Luis Valley explains that alligators were first brought in to his Tilapia fish farm to serve as 'garbage disposal'. The fish farm is based on a 2,050' deep geothermal artesian well that delivers 30.5° C water year round. The 80 acre farm has been raising Tilapia since the 1960.

In 1985, a 65 acre wetland was established to allow the artesian water to absorb back into the ground and to provide haven for ducks, geese and herons. In 1987, 100 small alligators were brought in to dispose of dead fish and processing waste, that can be 60% of whole fish weight after filleting. "By the time they got big many people had heard about them and wanted to see them," said Lynn Young. "So we opened to the public in 1990". In 1991, the gators were moved to an outdoor pen with warm water constantly flowing through it. Everyone has been surprised and excited to see them outdoors year round. In 1993, a large greenhouse building, the 'Tropical Ecozone' was constructed. Its primary purpose is to produce 10 million tilapia fingerlings annually and it is also used to grow organic greens and vegetables. The nutrient rich fish waste used to grow salad greens, herbs, edible flowers and watercress that are sold in gift shop under the "Gator Gardens" label.

In 1997, the farm produced its first captive bred alligators. A total of 24 gators hatched after incubation at 30° C. Incubation at this temperature usually produces females but most of the hatchlings were male. The owners speculate that the reduced air pressure at the 3,000m altitude of San Luis Valley may change the temperature dependent sex determining response. An additional seventeen eggs were hatched in 1998. -- *From GATOR GAZETTE, Spring 1999, reprinted in GATOR TALES, Vol 6 (2). American Alligator Cycle of Protection, P.O. Box 1637, Dade City FL 33526, USA.*

**ALLIGATOR BURIAL.** The Palmer Indian Burial Mound, near Sarasota, Florida, USA, dates from the Weeden Island culture of about 1,500 years ago and contains burials of several hundred humans, four dogs and an alligator. The mound was excavated in 1959. The alligator is an adult approximately 8 feet total length, buried stretched out in a natural position in the upper (most recent) levels at a depth of 7 - 11 inches among the nearly 400 human burials recorded at the site. Two strings of beads made from vertebrae of the sawfish *Pristis pectinatus* are placed parallel to the alligator's body. The longer string, 5 feet in length, stretches from the upper to the lower limb of the animal and is closely associated with it. The other, 3 feet long, parallels the first at a distance of 6 to 12 inches. Also associated at the same level are several sherds of pottery of types common in the mound. Three clay vessels were found in an adjacent excavation square and also a large number of fossil sharks teeth at about the same depth were possibly deposited as part of the same burial.

Why the alligator was interred in the Palmer Burial Mound is not evident. That it was a ceremonial burial is evident, implying a much more important event than nearby dog burials. Could it be that the animal had eaten an important person? In that case the strings of beads could be a burial offering to the person. But no human bones were found in close association with the alligator skeleton. More



Alligator skeleton excavated outside the Amelia Island, Fl. Spanish mission. G. Milanich photo

likely some kind of totemic relationship is implied. Were the last inhabitants of the site members of the alligator clan who personified with one of their totemic animals and buried him or her with their own dead? Similar interments of alligators are not reported for any other Florida Indian sites.

A Spanish colonial mission site at Amelia Island Florida dating from 1684 -1702 was found to have an alligator buried just out side of the wall of the friars quarters (J. Milanich pers. comm). — submitted by Sylvia Scudder, *Florida Museum of Natural History, Gainesville, FL 32611 USA, from Bullen, R. P. and A. Bullen. 1976. THE PALMER SITE, Florida Anthropology Society Publications No. 8. Florida Anthropologist Vol 29, No.2. part 2: 44-46.*

## ZOOS



**CUBAN CROC SSP ADVANCES.** The fundamental goal of the Cuban Crocodile Species Survival Plan is to help insure the long-term survival of this organism in nature. From 15 March – 3 April 1999 Michael Davenport, the SSP studbook keeper and Bill McMahan, SSP species coordinator joined Roberto Rodriguez Soberon, Jefe Programa Nacional de los Cocodrilos, Cuba and staff from Flora y Fauna for conservation work. Fieldwork was continued in the monitoring process for the reintroduced population of Cuban crocodiles (*Crocodylus rhombifer*) in the

Lanier Swamp on Cuba's Isla de la Juventud. Twelve specimens ranging in size from 40 – 226 centimeters TL were captured. Evidence of successful reproduction in the reintroduced population was collected. Unmarked young specimens were captured in different localities in the swamp. Additionally, an adult male and female crocodile were captured in a saw grass



Participants at the SSP photographed in the Louisville Zoo's new Cuban crocodile exhibit. L to R front row- Louisville Education Curator Marcelle Gianelloni, Roberto Soberon, Andy Odum; center, Kent Vliet, Bill Mc Mahan, Terry Cullen; back, Bill Quatman, Will Bird, and Mike Jones.

(*Cladium jamaicense*) savanna pool bordered by a Caribbean hardwood hammock. About 7.5 meters from this pool, inside the hammock, a nest and egg shells from a previous season were discovered. Juvenile specimens were collected and marked utilizing the existing numerical system for removing dorsal caudal scutes. All adult specimens captured were checked for marked numbers, then dispersal distance from point of origin recorded with a GPS unit and existing habitat utilization logged. Air, water and cloacal temperatures were recorded, as well as size, gender and overall physical assessment. All Cuban crocodiles encountered on the expedition appeared to be thriving.

Poaching of crocodylians for meat still occurs in the Lanier, but the scale is unknown at present. Similarly, the degree of ecological competition imposed by the introduction of the common caiman (*Caiman crocodilus fuscus*) on Isla de la Juventud in the late 1950's is difficult to ascertain. Caiman are abundant throughout the island, whereas Cuban crocodiles appear to be confined to the eastern half of the Lanier, but this needs further investigation.

To aid in the ongoing public relations effort for Cuban crocodile conservation in Cuba, Zoo Books about crocodylians (in Spanish) and Cuban Crocodile SSP caps were distributed to conservation personnel at the two Cuban *rhombifer* facilities to help heighten the animal's public profile and help provide staff with good information for dissemination to visitors and people of nearby communities. An effort is also being made to name Isla de la Juventud's baseball team "Los Cocodrilos Cubanos".

On 2 April 1999, Roberto Rodriguez Soberon and AZA's species coordinator crafted a document entitled "Recommendations for Cuban Crocodile Conservation" whereby specific objectives are delineated under the following headings:

Management, Species Biology, International Collaboration, Public Education, and Captive Management and Research. The document was well received at a central planning meeting of Cuba's national conservation agency, Flora y Fauna, on 5 April 1999 for ministers from all of the different provinces.

On 4 – 5 May 1999, the second Cuban Crocodile SSP Masterplan session was held at the Louisville Zoo, USA. Roberto Rodriguez Soberon attended and was integral in the process. Recommended pairings have occurred involving translocation of AZA stock (stdbk. #'s 76, 55 and 7 ). Research is being conducted exploring the feasibility of importing animals from Cuba to genetically augment the AZA population and vice-versa. Two goals are the integration of Cuban and AZA *ex situ* populations as well as the preservation and genetic enhancement of wild populations. A Cuban Crocodile Festival is scheduled 21 – 25 January 2000 on Isla de la Juventud, following the CSG Meeting in Varadero. – Bill McMahan, AZA Species Coordinator, Cuban Crocodile Species Survival Plan, Louisville Zoo, USA .

## MEETINGS

### 15<sup>th</sup> Working Meeting of the Crocodile Specialist Group Varadero, Cuba 17 – 20 January 2000

#### GENERAL INFORMATION.

The 15<sup>th</sup> Working Meeting of the Crocodile Specialist Group will be held at the international beach resort of Varadero, Republic of Cuba.

#### REGISTRATION

Participants are asked to submit a Registration Form as soon as possible, however, registration payments can be paid on arrival at the Meeting. The Registration Fee for the meeting is \$150.00 US. This charge covers credentials and admission to all sessions of the meeting, opening ceremony, welcome cocktails, coffee breaks, a mid-week informal beach barbecue, and closing dinner. Programs and notes, daily hotel transport and the Meeting Proceedings are also included. A modified registration fee of \$80.00 US is charged to companions, (spouses, children etc.) who wish to attend the meeting and social events.

A separate call for papers will be issued in the CSG Newsletter.

For registration and to receive additional information contact:

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Cuidad de la Habana,  
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Phone 537 84 5396,  
fax 537 84 5443 or 537 24 9227

## TRADE



CROCODILIAN SKIN PRODUCTION AND TRADE ESTIMATES. At the 14<sup>th</sup> Working Meeting of the CSG last year the membership suggested that relatively current skin production estimates could be requested directly from Management Authorities and National agencies by CSG. The Executive Officer was directed to implement this suggestion on a trial basis. In April 1999, a letter and short questionnaire was sent to the CITES Management Authority and to additional contacts in every crocodilian skin producing country (30 in all). The letter requested that parties provide estimates of production and export of crocodilian skins for calendar 1998 or the most recent year available expressed in terms of whole skin equivalents. By providing these data parties agreed that the information would be disseminated by CSG in the Newsletter.

Responses have now been received from 18 countries, a response of 60% that we feel is very good considering the preliminary and novel nature of this request. Responses were quite variable by region: 6/7 from SE Asia, 8/12 from the Americas and 4/11 from Africa. As anticipated, the data generated are interesting but not complete or completely comparable. It is therefore not possible to make precise estimates of total production or total export for any species or for a particular year. However, the patterns and levels of recent production are quite clear (Table 1). Here I will discuss production, assuming that exports reflect production in immediately preceding years. Estimates were variously provided for either 1997 or 1998 but the relative changes from one year to the next are probably small and buffered by carry over of previous production and market factors, and can therefore be reasonably combined to estimate current production capacity.

As expected, *Caiman crocodilus* continues to dominate world trade with production and exports exceeding 600,000 in recent years and the great majority of this production from Colombia. The production of American alligator in the USA continues to increase.

exceeding 200,000 in 1998. Nile crocodile reached nearly 60,000 with Zimbabwe dominating production and exports. *Crocodylus porosus* production increased substantially, exceeding 50,000 although changed climatic conditions in PNG may reduce this figure this year. *C. novaeguineae* continues to be a small but stable component of world production at around 42,000. The remaining species contribute a negligible proportion to the total although recent reports indicate that production of *C. acutus*, *C. morletii* and *C. rhombifer*.

The value and interpretation of this information requires some care. Apprehensions were expressed to this office that such data could be destabilizing or affect market competition and even influence price and demand. It is possible that some non-respondents declined to share their information for these reasons. However, as all the major producers have freely shown their hand, and as the results have no surprises at all, such reticence seems ill founded.

These data continue to be insufficiently precise or comparable to allow true market analysis. If the Steering Committee decides to continue the experiment, then more careful instructions to respondents may help. The summarized data do not fully reflect the detail provided by many respondents, often computer printouts of individual shipments and farm production (which will be maintained in confidence). It is evident that many authorities do track production and/or exports and can produce these statistics at relatively short notice on request.

A question increasingly leveled at some national crocodile management programs is whether they are economically sustainable as well as biologically sustainable. We believe that stable and equitable markets promote economic sustainability across the world skin industry and in the long term, benefit all participants. We hope timely estimates of crocodilian skin production will assist this stability. Comments, corrections and criticism of this report is welcomed. -- Perran Ross, *Executive Officer, CSG.*

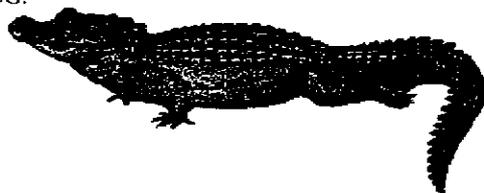


Table 1. Estimates of current crocodilian skin production capacity.

exp = exports, pro = production

SPECIES	Country	1997	1998	notes
<i>C. crocodilus</i>				
	Colombia	648,766	--	exp
	Venezuela	64,487	15,139	pro
	Nicaragua	--	4,764	pro
	Guyana	410	--	pro
	Brazil	--	600	pro
<i>C. c. yacare</i>				
	Bolivia	--	17,609	pro
	Paraguay	--	2,875	exp
	Brazil	--	5,100	pro
<i>A. miss</i>				
	USA	180,582	--	exp
		198,357	200,337	pro
	Israel			no data
<i>C. niloticus</i>				
	Zimbabwe	52,829	--	exp
	South Africa	--	1,528**	exp
	Ethiopia	--	4,000	pro
	Kenya	--	900	
	Mozambique	--	810	exp
	Madagascar			no data
	Malawi			no data
	Botswana			no data
	Tanzania			no data
	Uganda			no data
	Zambia			no data
<i>C. novaeguineae</i>				
	Papua NG	32,911	--	exp
	Indonesia	--	9,637	exp
<i>C. porosus</i>				
	Australia	--	10,309	exp
	Indonesia	--	3,827	exp
	Malaysia	--	21	exp
	Papua NG	41,489	--	exp
	Singapore	--	216	pro
<i>C. siamensis</i>				
	Cambodia	--	0	
	Thailand			no data
	Mexico	--	347	exp
	Australia	--	315	exp
	China	--	204	exp
	Argentina			no data
	Cuba			no data
	Honduras			no data

\*\* Data incomplete, Natal exports only.

CROCODILIAN BAN IN CALIFORNIA. We have received several inquiries from members about the legality of crocodilian imports to the State of California, USA. I started by looking at the web page of the California Fish and Game Department <[www.dfg.ca.gov](http://www.dfg.ca.gov)> and from there called by phone to their general inquiry number and spoke to representatives of their wildlife enforcement. They referred me to the California Statutes- Penal Code sections 653 o., p & r. which are available on the web at <http://www.leginfo.ca.gov/cgi-bin/calawqucry> (search for 'endangered species') and state as follows:

*'California Penal Code 653 o. (a) It is unlawful to import into this state for commercial purposes, to possess with intent to sell, or to sell within the state, the dead body, or any part or product thereof, of any alligator, crocodile, polar bear, leopard, ocelot, tiger, cheetah, jaguar, sable antelope, wolf ( Canis lupus), zebra, whale, cobra, python, sea turtle, colobus monkey, kangaroo, vicuna, sea otter, free-roaming feral horse, dolphin or porpoise (Delphinidae), Spanish lynx, or elephant.*

*Any person who violates any provision of this section is guilty of a misdemeanor and shall be subject to a fine of not less than one thousand dollars (\$1,000) and not to exceed five thousand dollars (\$5,000) or imprisonment in the county jail for not to exceed six months, or both such fine and imprisonment, for each violation.*

*(b) The prohibitions against importation for commercial purposes, possession with intent to sell, and sale of the species listed in this section are severable. A finding of the invalidity of any one or more prohibitions shall not affect the validity of any remaining prohibitions.*

*653 p. It is unlawful to possess with the intent to sell, or to sell, within the state, the dead body, or any part or product thereof, of any species or subspecies of any fish, bird, mammal, amphibian, reptile, mollusk, invertebrate, or plant, the importation of which is illegal under the Federal Endangered Species Act of 1973 (Title 16, United States Code Sec. 1531 et seq.) and subsequent amendments, or under the Marine Mammal Protection Act of 1972 (Title 16, United States Code Sec. 1361 et seq.), or which is listed in the Federal Register by the Secretary of the Interior pursuant to the*

*above acts. The violation of any federal regulations adopted pursuant to the above acts shall also be deemed a violation of this section and shall be prosecuted by the appropriate state or local officials.*

*653 r. Notwithstanding the provisions of Section 3 of Chapter 1557 of the Statutes of 1970, it shall be unlawful to possess with intent to sell, or to sell, within this state, after June 1, 1972, the dead body, or any part or product thereof, of any fish, bird, amphibian, reptile, or mammal specified in Section 653o or 653p. Violation of this section constitutes a misdemeanor.'*

This provision remains current and can be enforced by any State of California law enforcement officer including police, state highway patrol or wildlife officer. This statute dates from 1972 and appears to be a response to the US Endangered Species Act. In that sense it is an anachronism. As this provision is part of the State of California Statutes (and therefore has a higher level of law than merely a wildlife regulation) it could only be changed by a vote of the California legislature. Section 653 o. b. suggests that it might be possible to have crocodiles and alligators removed from this list without having to change the whole law. The ban does not prohibit the entry of personal possessions of alligator and crocodile material, only commercial intent and sale, so while this effectively prevents direct sales in California an individual can presumably bring their own possessions (c.g. handbag, wallet, belt etc.) into the State.

I am not aware of any other states that specifically ban sale of crocodilian products beyond the provisions of the US Endangered Species Act, except that all the states that have native alligators have regulations regarding the labeling and proof of legal origin of alligator and (sometimes also crocodile) products. Many States also restrict the ownership, possession and sale of live crocodilians. -- Perran Ross, Executive Officer CSG.



## PERSONALS



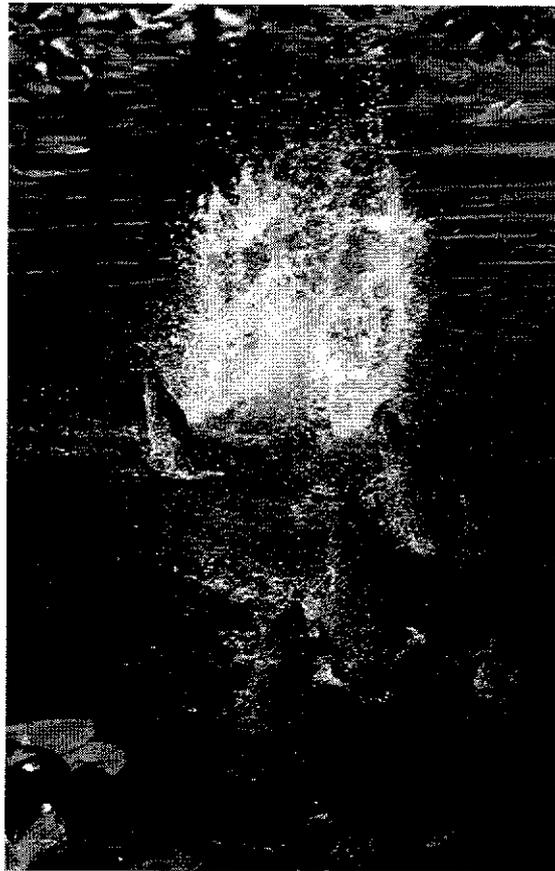
Marco Lazcano B. -  
- *Amigos de Sian  
Ka'an A.C., Ave.  
Coba 5 entre Nube  
y Brisa, Plaza  
America Locales  
48-50, 2 piso,*

*Supermanzana 4, Cancun, Quintana Roo, 77500  
Mexico.* (new address) announces he is stepping  
down as Director of El Eden and taking office as  
the new Director of Amigos de Sian Ka'an A. C.  
on August 23rd. He will continue work at El  
Eden Conservation Reserve now as a Board  
Member.

Steven Platt, 1674 Ormandy Drive, Baton  
Rouge, LA 70808 USA, is taking an unscheduled  
sick leave from his position as the Wildlife  
Conservation Society's Southeast Asian  
representative. Steve was involved in a car  
accident in Myanmar and has a broken collar  
bone. This follows John Thorbjarnarson's  
accident in China last year. Both are recovering  
fully. (Perhaps WCS needs to invest in some  
defensive driving lessons and some heavy  
vehicles for overseas staff? Eds.)

Grahame Webb and Giovanna Cortes proudly  
announced the birth of their son Frederick  
Rodrigo Webb at Darwin Royal Hospital 21  
September 1999. Everything went fine and he  
was 3.1 (kg) (= 6.82 lbs) and 50 cm (19.8  
inches) long. Just in case there is anyone out  
there who has not yet admired this fabulous  
addition to the crocodilian research world, you  
can see pictures on the web at the following  
address: <http://crocodilian.com/giovanna>  
Congratulations to Giovanna and Grahame and  
welcome Frederick.

Rene Honegger, *Herpetoinform, Mythenstrasse  
6, CH-8802 Kilchberg, Switzerland*, has retired  
as Curator of Herpetology at Zurich Zoo. Rene  
intends to remain involved with herpetology and  
conservation with his own firm of  
'Herpetoinform' where he will consult on  
zoobiology of aquaria, terraria and ponds,  
amphibian and reptile culture and identification  
of wild fauna and their products.



*Happy CSG members plunge into the heated  
pool at Varedero Convention Center. Don't  
miss the fun, Meeting information page 17 and  
Call for Papers next page.*

**EDITORIAL POLICY** - The newsletter must  
contain interesting and timely information. All news  
on crocodilian conservation, research, management,  
captive propagation, trade, laws and regulations is  
welcome. Photographs and other graphic materials  
are particularly welcome. Information is usually  
published, as submitted, over the author's name and  
mailing address. The editors also extract material  
from correspondence or other sources and these items  
are attributed to the source. The information in the  
newsletter should be accurate, but time constraints  
prevent independent verification of every item. If  
inaccuracies do appear, please call them to the  
attention of the editors so that corrections can be  
published in later issues. The opinions expressed  
herein are those of the individuals identified and,  
unless specifically indicated as such, are not the  
opinions of the CSG, the SSC, or the IUCN-World  
Conservation Union.

**15<sup>th</sup> Working Meeting of the Crocodile Specialist Group  
Varadero, Cuba, 17 – 20 January 2000**

**CALL FOR PAPERS**

Papers are invited for presentation at the 15<sup>th</sup> Working Meeting of the CSG. Following the successful program initiated at the 14<sup>th</sup> Meeting in Singapore, 1998, we will focus the plenary sessions on major overview papers and extended discussion. Information of a less comprehensive or routine nature will be directed to poster displays. Written versions of both Presentations and Posters will be accepted for publication in the Meeting Proceedings. Papers are invited on any topic pertaining to crocodilians however, papers that fit into the session topics will be more likely to be accepted as presentations.

1. Crocodilian conservation and management in Cuba.  
Highlighting the Cuban crocodile program and conservation activities.
2. Dealing with success: managing human-crocodile interactions.  
Addressing problems resulting from increasing contact between expanding crocodile populations and people.
3. Recent advances in crocodilian research.  
General advances in Ecology, Physiology, Endocrinology, Behavior
4. Biology and Conservation of *Crocodylus acutus*.  
Addressing the special issues and status of the widespread species.
5. Crocodile disease and veterinary treatment.  
A focus for our growing Veterinary and husbandry contingent.

An additional special session is planned Conservation of large reptiles- lessons from crocodilian sustainable use in which we hope to attract presentations on the broad issues affecting large reptiles (pythons, iguanas, turtles, crocodilians).

These programs may be adjusted depending on the papers received.

To apply to present a paper please send the following information to:

E-Mail [prosscsg@flmnh.ufl.edu](mailto:prosscsg@flmnh.ufl.edu) [Communications by E-mail greatly preferred.] or  
Dr. J. P. Ross Executive Officer CSG  
Florida Museum of Natural History  
University of Florida Box 117800  
Gainesville FL 32611 USA  
Fax 1 352 392 9367

TITLE:

AUTHOR (s) NAME:

MAILING ADDRESS FOR ONE AUTHOR (Including E-mail or fax):

ABSTRACT: One to three paragraphs (no more than one page) summarizing the paper  
Please indicate SESSION to which the paper is addressed and whether the paper is a  
Presentation or Poster or either ?

Acceptance, author's instructions and allocation to Sessions or Posters will be advised by 30  
November 1999.

## Steering Committee of the Crocodile Specialist Group

Chairman: Professor Harry Messel, School of Physics, University of Sydney, Australia.

For further information on the CSG and its programs, on crocodile conservation, biology, management, farming, ranching, or trade, contact the Executive Officer or Regional Vice Chairmen:

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