

CROCODILE SPECIALIST GROUP

NEWSLETTER

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COVER PHOTO. Male gharial, Ft. Worth,
Texas.

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Editorial

MANAGEMENT OF CAIMAN. We recognize that crocodilian management is unavoidably linked to the limitations of capacity and conditions in each country. Caimans (*Caiman crocodilus* and *Caiman yacare*) remain extremely abundant and widespread in most of their range, are not listed on the IUCN Red List and are not endangered species. Caiman management is therefore not a species conservation issue but relates to value

added use and wetlands conservation. The success of these programs is an indication of whether the mechanisms for sustainable use and regulated trade proposed by CSG and implemented by national authorities are workable under the conditions pertaining in different range states. The CSG steering committee learned recently of some current problems in caiman management that we need to review and understand.

Last October, representatives of the Paraguay CITES Management Authority, SEAM, presented a management plan and precautionary harvest quotas for *C. yacare* in Paraguay based on the successful system developed in Venezuela. In December 2002 we learned that contrary to this plan, a new Minister of the Environment had instituted unregulated harvest and that SEAM was issuing export permits and CITES tags for wild harvested caiman in excess of previously proposed harvest and export quotas. The new harvest program was claimed to provide food (caiman meat) for indigenous people, but information from the field indicates this is not the case. Neighboring countries reported increased illegal harvest and numbers of skins for sale without tags or permits.

CSG, working through regional members, the regional Vice Chair, Fundacion Biodiversidad, and TRAFFIC Sur America, intervened—fact finding, bringing national and international scrutiny to bear, and reporting the whole issue to the CITES secretariat and CITES Management Authorities in major importing countries (EU, USA). At present, the Minister has resigned, SEAM staff implicated in the improper permit issuance are under investigation and *yacare* imports to the EU are blocked.

In Colombia a sensational press article (*Vanguardia Liberal* March 2003) describes a gang operating in the Magdalena River Valley, illegally harvesting wild caiman and selling the skins to farms and tanneries where they are alleged to be mixed with legal farmed skins. The report is unverifiable and the volume of this reported illegal harvest is modest, but it remains a disturbing example of the absence of effective national regulation.

The good news is that both these situations quickly came to the attention of international and CITES interests and controls at the importing countries were imposed— one of the great strengths of the CITES system. Internal analysis of the harvest program in Bolivia has also addressed similar problems (see Aparicio & Rios, p. 12 of this Newsletter).

These examples bear examination on the apparent cause of the breakdown. Why, when legal channels for production and international trade in these species are well established and easy, do producers and traders engage in illegal action? The simple answer is that it is profitable. The purchase price of illegal skins is lower than legal skins (and therefore the profit margin higher) because the intrinsic costs of intensive production, management and conservation are not included in the price. However, this profitability is only available at the level of the first purchaser of the wild skins. Further up the chain of consumption, the prices and profits of legal and illegal skins must be identical because once tagged and permitted, they are indistinguishable. This suggests that there is a stakeholder group who are currently under-rewarded and inadequately regulated—the people at the first step of trade above production—smaller scale traders and in-country tanners. CSG has long advocated that the point of most effective control for the crocodilian skin trade is at the point of first processing. As the bulk of international caiman skin trade occurs as crusted (partially tanned) skins, the point of optimum control is the in-country tanneries and the traders who purchase raw skins for them. This is difficult without a secure and stable regulatory capacity. The political traditions of many caiman producing countries cause a complete replacement of government personnel at each change of government. Thus there is little institutional memory, and weak incentives for long term effective regulation. These problems are made worse by the breakdown of law and order associated with economic collapse, political insurrection and drug production and trade. CSG is unlikely to affect these deeply rooted problems in the region, but we can continue to expose and condemn improper management and use the available CITES mechanisms to ensure that illegal trade does not benefit from the economic subsidy from legal producers. We can work within the region to build capacity. Our natural partners in this endeavor should be the legal producers who have invested in the resource and who suffer from unfair competition from illegal skins. — Perran Ross, *Editor* with advice and assistance from Bernardo Ortiz, Alejandro Larriera, Alvaro Velasco and Grahame Webb.

Regional Reports



Africa

Benin

NOTES ON CROCODILES IN BENIN. My research in Benin involves an inventory and characterization of water reserves and a census of the crocodiles that colonized dams and water ponds. During the course of my work, I have observed all three African crocodile species: *Crocodylus niloticus*, *Crocodylus cataphractus* and *Osteolaemus tetraspis*. There are also reports of a completely white crocodile occurring in Benin. It is unknown whether this is a color form, albino or other species. The study identifies the factors that determine crocodile abundance and distribution patterns, as well as various socio-economic and socio-cultural practices that affect crocodiles.

The people of Benin have many complex relations with crocodiles because they use them for food, medicinal products, and their religious beliefs. In Benin, most parts of a crocodile's body (e.g., the heart, lung, head, and teeth) are used in traditional medicine to cure diseases. For example, crocodile lung is used to cure asthma. The religious role of crocodiles is also important and has contributed to their protection in Benin.

I have observed a water pond inhabited solely by dwarf crocodiles (*O. tetraspis*); where other species are not permitted. In that pond, the crocodiles are sacred—a village fetish, of sorts. My study shows that ethnic group, religious role of crocodiles, and traditional methods of conservation are the main factors to consider in the management of crocodiles populating Benin's water reserves. — Nathalie Kpera, *Agricultural and Forest Management Engineer and Reptile Specialist, Applied Ecology Laboratory of the University of Abomey-calav, 01 BP 526 Cotonou, Benin.* <nathbiche@yahoo.fr>.



Tame crocodile in Benin. N. Kpera photo.

Botswana

OKAVANGO NILE CROCODILE PROJECT. The Okavango Crocodile project, led by Dr Alison Leslie of Stellenbosch University, South Africa, commenced in early January 2002. Staff all currently based at Shakawe Fishing Camp, provides us with convenient and direct access to the Okavango River.

This project will contribute to an understanding of the ecology and physiology of the Nile crocodile.

Objectives:

- 1) To determine the distribution, status and abundance of *C. niloticus* in the Okavango system.
- 2) To compile a database on movements, home-range and dispersal patterns of the various size classes of crocodiles.
- 3) To study the reproductive biology of the Nile crocodile in Botswana (TSD, reproductive cycles, hatching success, and survivorship).
- 4) To study the diet, feeding habits, and morphometrics of the various size classes of crocodiles.
- 5) To investigate gene flow and mating strategies in Okavango Nile crocodiles.
- 6) To determine the health status of the crocodile population of the Okavango system.
- 7) To provide information on crocodilian parasites.
- 8) To determine the extent of the crocodile/human conflict in the region.

9) Capacity building.

10) To provide scientific expertise and detailed biological information to assist crocodile farmers in Botswana and other parts of Southern Africa.

11) To highlight the conservation implications of the study and to provide management recommendations to the Department of Wildlife and National Parks (DWNP).

Research Results:

In six months our research team has captured over 300 Nile crocodiles, ranging in size from 26 cm to 3.67 m. This figure includes over 30 recaptures. For each animal, we determined sex, length, and weight and collected blood and urine samples, which were frozen for later use. We then tagged and released each crocodile at its site of capture, recording the coordinates of each capture position with a Global Positioning System (GPS) unit. Coordinates later will be fed into a Geographical Information System (GIS) in order to determine seasonal distribution patterns. Current sex ratios indicate a bias towards females.

In February, we commenced with nesting surveys. The GPS positions of all possible nesting areas (a total of 106) within the main channels between Mohembo and Red Cliffs have been recorded. These sites will be correlated with actual nesting figures this nesting season (September 2002). The research team is assisting crocodile farmers with egg collection this breeding season. Two breeding females have been radio tagged with transmitters sponsored by National Geographic. Four more transmitters will be attached to adult animals in November 2002, and the first aerial survey will be carried out.

The research team has made a good start with regard to examining the crocodile/human conflict in the area. In early 2003, this team will include an additional Botswanan MSc student.

We are collaborating with KCS (Kalahari Conservation Society) on the "Every River Has Its People" project and with CI on a possible hippopotamus project. A PhD bursary will be offered to a Botswanan student, Ms. Belda Mosepele, so that she may conduct a water quality study in the upper reaches of the Panhandle.

In February 2002, the project leader and co-leader visited Mohembo Primary School together with staff of the KCS. We met the headmistress, Mrs. Ester Maokisa, and all the school teachers

and have since invited them to visit our base camp. We also volunteered to give presentations at the school and to assist school children with various environmental projects.

In March 2002, the team visited “Bana Ba Metsi” school at Red Cliffs. In the near future the crocodile research team will be assisting with the construction of additional school buildings. On several occasions, team members also visited the Samochima Pre-school, where teacher Ronald Gaopalelwe has been very welcoming.

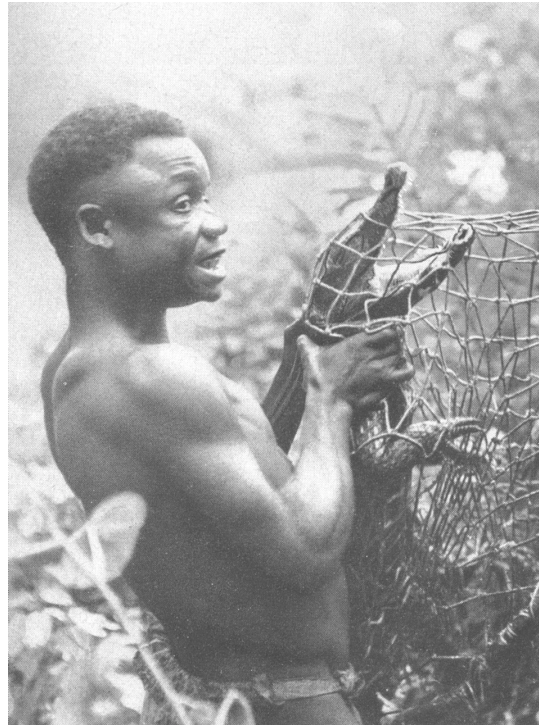
From 8-11 June 2002, the Okavango Crocodile Project sponsored the prize winners of the ‘Every River has its People Project.’ Twelve lucky school children spent the weekend with the research team and experienced first-hand how a research team functions in the field.

Publicity about the project appeared in the February 2002 issue of Ngami Times and in the May/June 2002 issue of the Air Botswana in-flight magazine, Marung. In August 2002, Global Adventure Travel magazine, the National Geographic, and Dr. Brady Barr produced a documentary on the study.

It is only through educational efforts such as those described above that we will be able to promote the crocodile as a valued keystone species in the Okavango ecosystem. — Allison Leslie, *Dept. of Conservation Ecology, University of Stellenbosch, Private Bag XI, Matieland, 7599, South Africa.*

Congo

NEWS ABOUT CONGO DWARF CROCODILES. In 1919, K.P. Schmidt described a new genus and species of crocodile, *Osteoblepharon osborni*, a central African dwarf crocodile whose type locality was the Ituri forest, in the northeast of what was then called the Belgium Congo (later Zaire, and most recently the Democratic Republic of Congo). The new taxon was distinguished from the genus *Osteolaemus* by several osteological skull features, including a flatter and more slender snout. The description of a new genus for this animal was later considered to be unwarranted by Werner (1933. *Reptilia Loricata. Das Tierreich* 60:1-33), Mertens (1943. *Die rezenten krokodile des Natur-Museums Senckenberg. Senckenbergiana* 26:252-312), and Inger (1948. The systematic status of the crocodile *Osteoblepharon osborni*.



Bambuti pygmy in the Ituri Forest, Congo, capturing what appears to be an *O.osborni* in 1954. B. Grzimek photo.

Copeia 1948:15-19). However, all these authors were in agreement that *Osteolaemus osborni* should be considered a valid species. While no further substantial examination of the systematic relationship between these two forms has been done, the two now are generally consigned to the same species, and designated as *O. t. tetraspis* and *O. t. osborni*. However, it is clear that the relationship between these two forms warrants further study.

Brazaitis (1973. The identification of living crocodilians. *Zoologica* 58[3-4]:59-101) lists the two as subspecies and distinguishes them based on snout morphology (*O. t. tetraspis* having a more upturned – concave snout), the number of post-occipital rows (two transverse rows of four scales in *osborni*, one row of four in *tetraspis*), and the coloration of the palate. Here we provide two photographs of animals from the upper Congo (the *osborni* form). The first was taken by Bernhard Grzimek. While he is perhaps best known for his massive *Encyclopedia of Animal Life*, Professor Grzimek was a veterinarian initially employed for the reconstruction of the Frankfurt zoo after World War II and became world renown for his television programs and documentary movies on wildlife.

The photograph, taken by Prof. Grzimek, who was the director of the Frankfurt Zoo from 1945 to 1974, shows a Bambuti pygmy in the Ituri Forest capturing what appears to be an *osborni* in 1954. The photo was originally published in 1958 in *Exotarium Zoo Frankfurt*, a publication of the zoo. The other photograph was taken by Ludwig Trutnau, a well-known German herpetologist. It shows the skull of a young animal that Mr. Trutnau had obtained in the 1980s, which died soon after its arrival in Germany. It was identified as an *osborni* based on its postoccipitals. Its relatively flat snout seems to confirm this.

Thanks to Bruce Shwedick for bringing the Grzimek photo to our attention, and to the Grzimek family for granting us permission for its publication here. Thanks also to Ralf Sommerlad for sending us the photo by Ludwig Trutnau. — *Editors.*

South Africa

"IN MAFIKENS, WE PROTECT THE CROCS." This is the important message conveyed by this unusual woodcarving at the Manyane Game Lodge in Mafikens, South Africa (below). Human hands are shown gently cradling the crocodile. — Submitted by Bennitt Joubert, *Manyane Game Lodge, Mafikens, South Africa.*



Woodcarving at Manyane Game Lodge, Mafikens, South Africa. B. Joubert photo.



Osteolaemus tetraspis. osborni skull. L. Trutnau photo.

Eastern Asia

Indonesia

BABY CROCODILE CAUGHT IN MATRAMAN, JAVA. Agus, a resident of Matraman Dalam III neighborhood unit in Matraman, Central Jakarta, shows off a 1.4 meter young crocodile (photo below) caught from the nearby Ciliwung River.

Witnesses said that the young crocodile was one of three young crocodiles floating on the Ciliwung River on 3 February 2003. Matraman residents are still on the lookout for other crocodiles, fearing for their safety.

The young crocodile has been placed in a garbage cart equipped with a donation box so that local residents can deposit food.

And this is not a usual catch.

"I had this dream in which an elderly grandmother came to me and asked me to take care of her ailing grandchildren," a resident, Usup, was quoted by *detik.com* news portal as saying. "I did not pay much attention to the dream until the three crocodiles showed up as I was relaxing by the Ciliwung riverbank," he added.

Usup has refused to sell the crocodile, although several people have offered him a considerable amount of money, reaching up to Rp 600,000 (US\$68). "I guess it is my obligation to keep the crocodile because the granny in my dream said that her grandchildren were sick." Usup, nevertheless, said that he would give the crocodile to Ragunan Zoo so it could receive better care. — The Jakarta Post, *February 7, 2003.*



Agus, a resident of Matraman, Central Jakarta, Java, shows off a young *C. porosus* caught in the nearby Ciliwung River. Jakarta Post photo.

2002 FALSE GHARIAL SURVEYS AND WORKSHOPS IN SOUTHERN SUMATRA. From August–September 2002 false gharial surveys, a two-day provincial workshop and a one-day local government workshop were conducted in southern Sumatra by WMI, Wetlands International–Indonesia Program (WI-IP) and the Indonesian Ministry of Forestry, with international funding from Fauna & Flora International, Cleveland Metroparks Zoo, WMI, WI-IP and the Sophie Danforth Conservation Biology Fund (Roger Williams Park Zoo). These activities were implemented on the basis of WMI recommendations after surveys conducted in 2001 (Bezuijen *et al.* 2001. *Rapid Appraisal of the Conservation Status of the False Gharial in two locations in Southeast Sumatra, Indonesia*. WMI, Darwin), and reported in the CSG Newsletter.

Surveys: Surveys focused on the Merang River (South Sumatra Province) and Berbak National Park (Jambi Province), two sites identified by WMI surveys in 1995-96 as supporting internationally significant populations and nesting habitat of false gharials. 2002 was the fourth and third year, respectively, that these sites were surveyed for false gharials. As far we know, they are the only sites for which repeat spotlight data of this species exist.

Numbers in Berbak National Park were similar to previous years, and both false gharials

and saltwater crocodiles were seen. The most exciting find was the discovery of a false gharial nest, in peat swamp forest. The nest contained 13 opaque eggs, with a total clutch weight of 2.3 kg. This is the first confirmed nest for Berbak National Park. It is hoped that future false gharial surveys in the park will include the remote upper reaches of the park's main rivers, which are difficult to access, and which local people contend support false gharial populations.

A survey of a third site, Way Kambas National Park (Lampung Province, southern Sumatra), was conducted in late September. This area had never been surveyed previously, and the purpose of the survey was to determine whether *Tomistoma* occurred there. None were sighted, and the habitat is considered unsuitable for the species. Two *C. porosus* were sighted, and there appears to be abundant potential nesting habitat for *C. porosus*. No conservation priorities need to be applied to this park for *Tomistoma*.

2002 False Gharial Workshop: From 2-3 September the 2002 *False Gharial Workshop: Assessment of the Management and Conservation of the Merang River as Habitat for the False Gharial* was held in Palembang, the capital of South Sumatra Province. The workshop was implemented as a result of 2001 survey findings, to address management of the false gharial habitat and peat swamp forest in the Merang River. Thirty-six participants attended the workshop, from a wide range of national, provincial and local government agencies, NGOs, universities and commercial organizations. The workshop was opened by Ir. Adi Susmianto, Director of the National Department of Biodiversity Conservation Republic of Indonesia, and was reported in one national newspaper and two provincial newspapers.

Final workshop recommendations recognized the importance of managing the illegal logging in the river, and for specific follow-up with local government after the workshop. Under the relatively new conditions of "regional autonomy" in Indonesia, local (regional) governments are now as powerful as the provincial government they are located in, and their support is critical for the implementation of activities in their local area.

Particular efforts were made to invite senior local government delegates to the workshop, although they did not attend. Partly to address this, workshop recommendations included the formation of a small working group for immediate follow-up after the workshop. This working group

allowed a relationship to be established with the local government delegates that did attend, and resulted in a brief meeting with a senior local government official (within the relevant political region, three-hour drive from Palembang) on 9 September. Much interest and support in the project was indicated in this meeting. On the basis of this, it was decided that a presentation of the false gharial and Merang River would be held for senior local government delegates, to be presented by M. Bezuijen and WI-IP, on 17 September. The working group also defined a series of specific recommendations for the management of false gharial habitat, peat swamp forest and illegal logging in the Merang River, which would be discussed at this presentation.

Workshop proceedings were completed one week after the workshop and were distributed to participants. Copies will be forwarded to international sponsors and the CSG shortly, together with a detailed trip report. These activities in 2001 and 2002, conducted with limited funding and the voluntary efforts of Mark Bezuijen, have been most successful, and reflect the sound working relationship established by WMI and the IUCN-CSG with Indonesia over many years. We hope this progress will enable the next, perhaps most important stage of the project to be initiated: the implementation of specific conservation actions for the false gharial in the Merang River. New funds will almost certainly be required for this stage.

On 17 September a follow-up workshop was held in Sekayu (three hours from Palembang) for 20 local government officials from the "regency" which administers the Merang River area. This was considered a crucial workshop to secure local government support, particularly in light of national decentralization and the subsequent transfer of responsibility to the regency ("regional autonomy"). Mark Bezuijen presented an overview of "Project *Tomistoma*" and achieved goals similar to those from the provincial workshop. The workshop reinforced the need: for a commitment from local government; for international funding; for an inventory of natural resources; a rapid appraisal of the Merang River for the local government; and the formation of a small working group for follow-up activities.

Future directions for *Tomistoma* conservation in Indonesia need to be clarified. Potential actions are at different levels of complexity—ranging from annual monitoring surveys

(Merang/Berbak), surveys in new areas (e.g., Kalimantan), to the management of specific areas for this and other natural resources. — Mark Bezuijen, *Project Manager, Wildlife Management International, P.O. Box 530, Sanderson, NT 0812, Australia 0678 <taipanaau@yahoo.com>*.

Philippines

REPORT ON PHILIPPINE CROCODILE DEVELOPMENTS IN NORTHERN PHILIPPINES. As reported in CSG News, Oct.-Dec. 2000 (Vol. 19, no. 4), the Philippine crocodile, *Crocodylus mindorensis*, was rediscovered in the northern Sierra Mountains of northeastern Luzon in 1999. This critically endangered and endemic species is now being regarded as the most severely threatened crocodile species in the world. Since 1999, crocodile surveys have been carried out by the Northern Sierra Madre Natural Park – Conservation Project (NSMNP-CP) which is funded by the Dutch government and implemented by PLAN International until October 2002. Recently, mixed student teams from Isabela State University (ISU) of the Philippines and Leiden University of the Netherlands have been engaged in crocodile surveys under the framework of the Crocodile Research, Observance and Conservation (CROC) project, which won the British Petroleum Conservation Award Gold in April 2002. CROC is being implemented by the Cagayan Valley Program on Environment and Development (CVPED), a collaboration between ISU and Leiden University.

The survey results show that there are still small remnant *C. mindorensis* populations to be found in northern Luzon. A pilot conservation program was designed and implemented by the NSMNP-CP in the municipality of San Mariano with favorable results. In May 2002, a multi-stakeholder workshop was held in Isabela Province, Luzon to provide inputs to a long-term comprehensive conservation program for *C. mindorensis* in northern Luzon. During the CSG meeting in Florida of October 2002 discussions were held to arrive at more concrete plans and funding possibilities were explored.

Surveys were carried out in the northern Sierra Madre and Cordillera Mountains. Interviews were conducted in upland communities in all major watersheds of Isabela, Cagayan, Apayo, Ifugao and Mountain Provinces. Secondary information thus

gathered was field checked during daylight track searches and night spotlight surveys. Of crocodiles encountered, size was estimated and counts were repeated over several nights. In some localities, crocodile presence could not be confirmed because of difficult field circumstances. If secondary information was judged to be reliable and based on recent sightings, localities were labeled as suspected sites. Surveys were conducted by Yaron Oppenheimer (2001), Petra Oudejans (2002), Bernard Tarun, Dominic Rodriguez, Jessie Guerrero and Merlijn van Weerd (1999 – 2002) under the framework of the NSMNP-CP; Richard van Alphen, Sammy Telan, Arnold Macadangdang, Bernard Tarun, Jessie Guerrero and Merlijn van Weerd (2002) under the framework of the CROC project funded by the BP Conservation Award.

Three distinct areas in northeastern Luzon have remaining Philippine crocodile populations: (I) the foothills of the northern Sierra Madre in the Cagayan Valley, (II) the coastal plains of the northern Sierra Madre at the Pacific Ocean side, (III) the Cordillera Mountains at the Cagayan Valley side (Figure 1). In the Cagayan Valley side of the northern Sierra Madre in Isabela Province, six localities have been confirmed to be inhabited by *C. mindorensis* with three localities as confirmed breeding areas. Another six localities are strongly suspected to harbor *C. mindorensis*, including three at the Pacific Ocean side, but this has yet to be confirmed. A total of 41 individuals has been observed recently (2002) of which seven were adults.

In the Cordillera Mountains (Cagayan Valley side), only two localities are strongly suspected

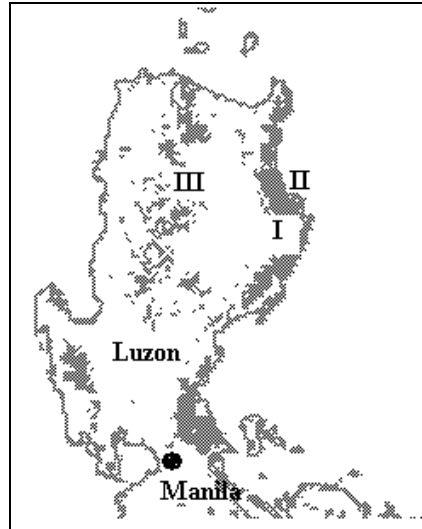


Figure 1. Northern Luzon with the three *C. mindorensis* distribution areas: (I) Sierra Madre Cagayan Valley side; (II) Sierra Madre Pacific Ocean side; (III) Cordillera Cagayan Valley side. Shaded areas show remaining forest in mountain ranges.



Figure 2. Placement of billboard at Disulap River Philippine Crocodile Sanctuary, San Mariano, in Sept. 2002. A. General photo.

to have remaining *C. mindorensis* but this has yet to be confirmed in the field. It is clear that the Philippine crocodile is still on the brink of extinction, even with these new population discoveries.

Conservation program:

A community-based conservation program was set up in the municipality of San Mariano by the NSMNP-CP in collaboration with the Department of Environment and Natural Resources (DENR) and the Local Government Unit (LGU) of San Mariano. Intensive information campaigns were followed by community meetings in which a sanctuary establishment scheme was designed for Disulap River, the first confirmed *C. mindorensis* locality where breeding was observed in 2000. The LGU enacted four ordinances aimed at the local conservation of the Philippine crocodile and declared *C. mindorensis* the municipalities' flagship species. The sanctuary was proclaimed in September 2001 and has been demarcated with billboards in local languages. The sanctuary is co-managed by

local communities who control activities in and around the river. Sustainable fishing activities are allowed except for the breeding area of *C. mindorensis* which is totally protected. Informative billboards have been placed in communities near the sanctuary (Figure 2). A community awareness poster has been designed and printed with funding from the Whitley Foundation via a Rufford Small Grant.

Philippine crocodile conservation workshop May 2002: A five-day workshop was held in May 2002 in Isabela Province to obtain inputs for a

long-term conservation program for *C. mindorensis* in Northern Luzon. The workshop was jointly sponsored and organized by the NSMNP-CP, the LGU of San Mariano and the DENR. Participants included delegates from local communities, Mayors of municipalities in the area, community workers and staff from the NSMNP-CP and local scientists from ISU. Acting Director Glenn Rebong of the Palawan Wildlife Rescue & Conservation Center (PWRCC, formerly CFI) was present with two staff members. Jenny Daltry from Fauna & Flora International shared her experiences in conserving the Siamese crocodile in Cambodia. Josie de Leon of the Protected Area & Wildlife Bureau (PAWB) as well as Chris Banks (Melbourne Zoo) and Dr. Angel Alcala were there as members of the Philippine Crocodile Recovery Team (PCRT). The PCRT is responsible for designing and implementing the National Recovery Plan for *C. mindorensis* which was printed and published in 2000.

One adult crocodile was seen at the Sanctuary. At Dinang Creek, only hatchlings and juveniles were observed. On the afternoon of 17 May, one juvenile (approx. 80 cm total length) was observed at 4 pm basking on the side of the creek in broken sunlight. All of the workshop participants (approx. 30 people) split into three groups to search various lengths of the creek at night. In total, 13 crocodiles were seen (nine hatchlings and four juveniles) – all via eyeshine only except one juvenile, which rested in the water about 10 m away for some time, allowing very good views of the head and forebody.

The mayor of San Mariano, Jesus Miranda (a strong supporter of conserving *C. mindorensis*) provided all participants with a commemorative t-shirt promoting conservation of Philippine crocodiles in the Northern Sierra Madre.

Identified Philippine crocodile localities and confirmed population size per age class, plus suspected crocodile localities.

Locality	Hatchling	Juvenile /sub-adult	Adult	Total	Suspected site
<i>(I) Northern Sierra Madre, Cagayan Valley side</i>					
Isa Isabela Province					
1. Abuan River					X
2. Kamalaklakan			1	1	
3. Pagsungayan					X
4. Lake Dungsog			1	1	
5. Lake Dunoy ¹	12		2	14	
6. Disulap River ¹			1	1	
7. Disabungan River		2		2	
8. Dinang creek ¹	14	6	2	22	
9. Ilaguen River					X
Total Cagayan Valley Northern Sierra Madre	26	8	7	41	
<i>(II) Northern Sierra Madre, Pacific Ocean side</i>					
Isabela Province					
10. Lake Dicitian					X
11. Dibol					X
12. Divilacan					X
<i>(III) Cordillera Mountains, Cagayan Valley side</i>					
Mountain Province					
13. Siffu River					X
Apayao Province					
14. Apayao River					X

¹ Confirmed breeding site

The workshop report has been finalized now and will be used as an input to a conservation program which is currently being drafted.

Future: Merlijn van Weerd presented the results of the research work and conservation activities in the Northern Sierra Madre at the CSG meeting in Gainesville of October 2002. At the same meeting Frederick Pontillas presented results of surveys elsewhere in the country with an exciting new discovery of a population in the Cordillera mountains of Abra Province in North-west Luzon. Combining the information, it becomes clear that Northern Luzon presents, at the moment, the best opportunities for a conservation program aimed at remaining wild populations.

The NSMNP-CP has been successful in introducing a community-based conservation program, but the scope of this project is limited in area and time and does not ensure sustainability. WWF Philippines is going to implement a second

phase of this project, again with Dutch funding, and has expressed its willingness to continue with crocodile conservation in the Northern Sierra Madre Natural Park.

One of the main constraints in *C. mindorensis* conservation in other areas, such as the Cordillera Mountains, is the lack of a strong local organization focused on in situ crocodile conservation in the Philippines. The expertise built up during the last years by the NSMNP-CP and CROC could be used to develop such a local organization. At this moment, a *C. mindorensis* conservation action plan is being written by us, in co-operation with Frederick Pontillas, the PCRT, the CSG and FFI. This action plan will incorporate the results of the May 2002 workshop and is aimed at establishing a local Philippine crocodile conservation group which will be able to secure long-term funding to implement an in-situ conservation program for the Philippine crocodile. — Merlijn van Weerd, *Centre of Environmental Science, Leiden University, PO Box 9518, 2300 RA Leiden, The Netherlands.* <Vanweerd@cml.leidenuniv.nl>; Jan van der Ploeg, *CVPED, EIC-building, ISU, Garita, Cabagan, Isabela 3328, the Philippines*; Chris Banks, *Melbourne Zoo, PO Box 74, Parkville, Victoria 3052, Australia*; & Alex General, *NSMNP-CP, EIC, ISU, Garita, Cabagan, Isabela 3328, the Philippines*. [Congratulations to Merlijn and Jan on their recent renewal of support from BP for this important program! — *Editors*]

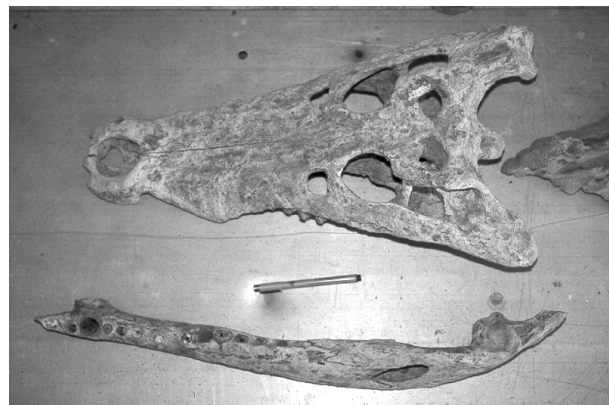
Vietnam

STATUS OF CROCODILES IN THE U MINH THUONG NATURE RESERVE, SOUTHERN VIETNAM. Both species of native crocodile, Siamese crocodile *Crocodylus siamensis* and estuarine crocodile *C. porosus*, are seriously threatened in the wild in Vietnam. The Siamese crocodile is considered to be critically endangered throughout its global distribution, and viable populations apparently no longer occur in Vietnam as a result of illegal hunting, habitat loss, accidental drowning in fish nets, and collecting to stock crocodile farms (Platt & Tri 2000). The estuarine crocodile is regarded as globally secure, although populations have been seriously depleted or extirpated in many countries (Ross 1998).

The current status of the estuarine crocodile in Vietnam remains largely unknown. According to Cuc (1994), populations near Vung Tao, Can Gio, and Kien Giang Bay, and on the offshore islands of Phu Quoc and Con Dao, are no longer extant. The swamp forest of the U Minh region in southern Vietnam was recently suggested to harbor the last remaining wild estuarine crocodiles in the country. We investigated the status of crocodiles in the U Minh Thuong Nature Reserve by conducting field surveys and interviewing local people. Field surveys found no signs of living wild crocodiles, and interview results strongly suggested that wild crocodiles have not occurred at U Minh Thuong Nature Reserve for perhaps as long as 30 years. [Extracted from "Pacific Conservation Biology, Vol. 8, No. 1, 2002] — Bryan L. Stuart, *Field Museum, Dept. of Zoology, Division of Amphibians & Reptiles, 1400 S. Lake Shore Dr, Chicago, IL, 60605-2496*; Benjamin Hayes, *Muir of Knock, Pityoulish, Aviemore, Inverness-shire, Scotland, PH221RD*; Bui Huu Manh, *Cat Tien National Park, Tan Phu District, Dong Nai Province, Vietnam*; & Steven G. Platt, *Wildlife Conservation Society, P.O. Box 9345, Siem Reap, Cambodia*.

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Skull found under 2 m of peat in U Minh Thuong Nature Reserve, Vietnam. Note the unusual holes in the snout, whose origin remains unclear. B. Stuart photo.

Western Asia

Bangladesh

CROCODILE CONSERVATION PROGRAM IN THE BANGLADESH SUNDARBAN MANGROVE FOREST. Three crocodile species naturally occur in Bangladesh. Some gharial still occur in the large rivers in the northwestern part of the country. The marsh crocodile has disappeared from the Sundarban decades ago, but the last three or four live in a pond near Bagharat not far from the Sundarban. The remaining estuarine crocodiles are mainly found in the Bangladesh Sundarban, but this population appears to be far below its potential. Previous population estimates vary between 40 and 200, which is less than would be expected in this vast mangrove area of more than 6,000 km².

Intensive commercial hunting in the past is probably the main reason for the bad state of the crocodile population. However, its protected status since 1973 apparently did not result in a population recovery. At present, hunting of crocodile may be insignificant, but the main threat to crocodiles is fishing, fewer available prey species, and increasing crocodile mortality. A second threat to crocodiles is pollution, which may reduce reproductivity and prey availability. All three crocodile species occurring in Bangladesh are fully protected by the Bangladesh Wildlife Act (1974).

A rigorous conservation program for estuarine crocodiles is needed to prevent this species becoming extinct in the Sundarban, as occurred a half-century ago with the marsh crocodile in this area. A crocodile conservation plan has been drafted by the Sundarban Biodiversity Conservation Project (ADB), proposing the following conservation objectives: improved protection; ranching and restocking; feasibility study on reintroduction of the marsh crocodile; and an improved understanding of population dynamics, distribution and breeding biology, and public awareness.

The Sundarban, which is managed by the Bangladesh Forest Department, has been subdivided into two types of conservation zones: wildlife sanctuary and production zone, where sustainable resource use is allowed. Protection measures for crocodiles target fishing, mainly by reinforcing its interdiction in sanctuaries and by



Forest Dept. officers transfer stock crocodiles to their new pens at the rearing station in Sundarban, Bangladesh. F. Deodatus photo.

closing smaller canals for fishing in the production zone. Measures are particularly useful for nesting areas, which are still remain to be identified.

A new crocodile rearing station has been constructed in the Karamjal Visitors Center with a capacity of 110-120 crocodiles. Hatchlings will be obtained from the wild, but the collection of eggs from the wild is dissuaded, as this may be too risky for the current endangered population. A crocodile breeding program with imported crocodiles may start later. A key issue is the development of a financial mechanism, using revenues from the visitor center, to cover the operation costs Building experience in crocodile rearing for conservation could simultaneously contribute to the future development of commercial crocodile farming in Bangladesh.

In July 2002, two Forest Department officers were sent to Australia to develop their skills in crocodile rearing and management. In November the construction of the rearing station was complete, and in early December all stock crocodiles were shifted to their new pens.

A feasibility study for the reintroduction of the marsh crocodile is also in the pipeline, but it is felt that this should start after building experience with estuarine crocs and after a new sanctuary has been established in the low-salinity zone in the northern Sundarban. — Floris Deodatus, *Sundarban Biodiversity Conservation Project, Bangladesh* <f.deodatus@wx.nl>.



BAGARHAT CROCODILES: REPORT ON FIELD VISIT, 4 MARCH 2003. The four participants in the field visit—Uttam Kumar Shaha, Nilmol Kumar Halder, and Floris Deodatus—held a 1.5-hour discussion with two Kadem (Muslim holy men) and then walked around the pond to investigate the conditions for nesting and to try to spot some of the crocodiles. No crocodiles were seen, as they usually spend most of the time in the water during this period (basking is usually observed in December and January). All descriptions of the site are based on our observations, but observations related to the crocodiles are those of the Kadem, and therefore may need to be confirmed.

Saint Khan Jahan Ali's Mazar pond in Bagarhat: The size of the pond is approx. 60 ha and maximum depth is 6 m. One side is more or less occupied by several mosques and other buildings. Three sides are bordered by “green space,” a mixture of small woody forest, small ponds, palm trees, scattered houses, trails. The pond is surrounded by a high ridge of soil (approx. 3–9 m high and perhaps even higher at some places) that resulted from its excavation in the middle of the 15th Century. The pond and surrounding land are owned by the mosque. The Kadem, who number between 20-30, all are involved more or less with the crocodiles; there are no special crocodile caretakers. Previously most of the area was covered with dense forest that was rich in wildlife. The eldest Kadem remembered seeing a tiger once about 60 years ago. Now the area is moderately populated but quite intensively cultivated. The site is part of a complex of many old mosques and a Hindu Temple which has been listed by UNESCO as World Heritage Site.

Current population: Five crocodiles: three females, one male and one juvenile (approx. 90 cm long). Estimated age of females is 40-50 years; male, 60 years.

Seasonal behavior: During the wet season, the crocodiles leave the pond and move around in surrounding creeks and ponds. During the dry season they all return to the pond.

Observations on reproductive habits:

- Mating/ponding in February/March, hatching in April-May (dry-hot season).
- Every year 1-3 nests are found approx. 50 cm underground, each containing 40-50 eggs.

- The last hatchlings were seen in 2000.
- Females guard nest on the shore staying usually as close as 3 m from the nests and returns at night to the pond for feeding
- Females sometimes eat hatchlings, which is regarded as the main cause of mortality.
- Nesting locations are scattered around along the three sides of the pond, which are less populated by humans.
- Ponding usually takes place at night, while hatching occurs both at night and in the daytime.

Old nesting sites visited:

(1) Approx. 30 m from the shore, 6 m above water level on a slope in woody vegetation. A large burrow under a palm tree where the female used to hide and guard. Approx. 1 m in front of the burrow the clutch was normally buried. Every year from 2000 to 2002, nesting was observed on the spot.

(2) Approx. 2 m from the water's edge and 80 cm above water level the clutch was buried. There was no burrow and the female used this site once, in 2001. The area is bare, with some scattered palms and other trees and an uninhabited building nearby.



Mugger crocodile sunning on the banks of Saint Khan Jahan Ali's Mazar Pond in Bagarhat, Bangladesh. F. Deodatus photo.

Mortality:

- The oldest Kadem (70 years old) estimated that he has seen ca. 50 dead crocs all of his life.
- One year ago a large 3 m dead (female) crocodile was found floating in the pond.
- All dead crocs are buried, as they are sacred.
- Monitor lizard is present in the pond, but no predation is related to this species

Management:

- Fishing is prohibited in the pond, which is therefore well stocked.
- No houses are allowed close to the pond (apart from the mosque area)

What next? The Kadem emphasize that crocodiles are sacred and they are not supposed to be taken away from the place, but later they told us that five or six years ago, 6-7 hatchlings (30 cm) were taken to Rasjahi Zoo. We should find out what happened to these crocs!

The Kadem are worried about the future of their crocs. They are interested to learn about possibilities to increase the number in the pond. Next week we will take them to our Karamjal rearing station, to show them what we do and continue our discussion. They are very interested. An option could be to establish a small incubation/rearing facility close to the mosque and rear young hatchlings. We could try both, eggs and hatchlings. Furthermore, we could check water quality and check the quality of the eggs during the coming month.

Reintroduction of the marsh crocodile in the Sundarban: At this stage, moving crocodiles from Bagarhat to the Sundarban is premature. In the future, however, if the crocodiles at Bagarhat increase, the idea of moving some crocodiles to the Sundarban could be introduced.

In the Northern Sundarban, at the very end of the Andaria Khal in the middle of the forest there is an old fishing pond (over 100 years old). It is similar to a very small Bagarhat pond, but there is a gap in the surrounding dike of excavated soil, allowing the flood to enter. The area is characterized by large bheels (vast open areas with *Phragmites*, *Cyperus*, and open water). Few people really know about these areas, because they are difficult to access. We carried out a vegetation mapping survey here in 2001. To me it appears to be a transition from mangrove into swamp forest, the end of the mangrove succession. Canals become narrow and water stagnates—mangrove trees die (the famous Sundri top-dying), resulting in open areas with entirely different vegetation composition and that are influenced less by river water and increasingly by rainwater.

We should find out current salinity levels and monitor succession. Comparing the current situation with old maps and photographs indicate that the bheels are increasing. Furthermore, we should know the tolerance of marsh crocodile to salinity. I am quite sure that if we would repair

the gap in the wall of the Andaria fishing pond, there would be more or less fresh water after one rainy season. Therefore this would be a perfect starting point for reintroduction.

In the new wildlife management plan for the Sundarban Forest we have proposed to establish a new wildlife sanctuary in this area. Apart from the marsh crocodile, this area has the potential for restoring some extirpated herbivores, such as swamp deer, hog deer, buffalo and even rhino. — Floris Deodatus, *Sundarban Biodiversity Conservation Project, Bangladesh* <f.deodatus@wxs.nl>.

India

UTTAR PRADESH AXES CROCODILE PROJECT DUE TO FUNDS CRUNCH. From Lucknow (Indo-Asian News Service): Due to a lack of funds, the state of Uttar Pradesh has decided to terminate a three-decade-old crocodile rehabilitation project. "Paucity of funds has compelled us to abandon the project," a wildlife official confirmed. The project was launched in the 1970s to rehabilitate crocodiles after they became seriously threatened. The official said the project authorities had not been receiving any grant from the state and central governments for years. New Delhi's last grant for the project was awarded in 1991, but the state government withdrew its financial support in 1999.

Since the project began, authorities released more than 3,000 fully-grown crocodiles into the Chambal and Ghagra Rivers, said R.L. Singh, principal chief conservator of forests in Uttar Pradesh. He added: "When we began the project, there were only 170 crocodiles in the state." — Hindustan Times, *New Delhi, India, 11 January 2003*.

Comments by Rom Whitaker on Recent Developments in India: The shutting down of the Uttar Pradesh crocodile project, which was responsible for a lot of the successful gharial restocking efforts at two sites (one on the Girwa—Katarniaghat Sanctuary—and the other at Chambal River—National Chambal Sanctuary—is symptomatic of the whole crocodile conservation work by state governments all over the country. They are finding that it is very expensive to rear lots of crocodiles in captivity when the outcome is only to try to release them into the wild. In reality there are very few suitable protected areas to

release any of the three species, but the gharial in particular is still a source of great concern. Virtually the only population with long-term viability (1,400 at last count) is on the Chambal River. Our recent visits there confirmed that pressures like riverside usage by people for sand mining, farming, fishing, and planned dams are pressurizing gharial by targeting sand banks, (adjacent to deep portions of the river) where they have to bask and nest. The Crocodile Bank may be doing a brief survey of the Chambal soon and may have a better handle on the threats to the gharial there.

Unfortunately, the political climate in India right now is not good for conservation—the ruling party is so focused on their religion that little time or attention is given to environmental matters. Nevertheless, I think that we should draft a letter to the central government as well as to the various state governments which have the greatest responsibility for our three species. I'll work on some of the points and circulate them.
— Rom Whitaker, P.O. Box 21, Chengalpattu India 603001 <draco@vsnl.com>.

[Editor's note: The Hindustan Times article and R. Whitaker's comments, above, were submitted by Dr. Grahame Webb, *Director of Wildlife Management International*, P.O. Box 530, Sanderson, NT 0812, Australia 0678 <gwebb@wmi.com.au>]

South America

Bolivia

SUMMARY OF NATIONAL WORKSHOP: "EVALUATION OF THE PROGRAM FOR SUSTAINABLE USE OF *CAIMAN YACARE* (LAGARTO) IN BOLIVIA." In 1997, the Bolivian government launched a pilot program for the sustainable use of *Caiman yacare* ("lagarto") in the Department of Beni (D.S. 24774). After 8 March 2000, when changes were made in the existing models for the management of *yacare*, a law addressing the conservation and sustainable use of *Caiman yacare* (R.M. 049/00) was enacted, broadening the national program to the departments of Pando and Santa Cruz. In 2001, population estimates were conducted and quotas of legal harvest were established for all three departments, thereby

laying the groundwork for the commercial exploitation of the resource.

The program evaluation workshop was held 2-4 April 2002 in the city of Trinidad, Department of Beni, with the participation of peasant organizations, indigenous groups, cattle ranching federations, tanneries, departmental governments Beni and Santa Cruz, the Directorate General of Biodiversity (VMMARN and DF), and national and international crocodile specialists.

During the workshop, numerous weaknesses in the program were identified. Among them were the incomplete inventory of *yacare* in Pando and Santa Cruz and the interference of the beneficiaries of the program (cattle ranchers, comunarios, and indigenous peoples) in the process of assigning the individual commercial harvest quotas granted by the municipal governments.

Positive features of the program identified include its success in increasing the participation of different social groups, especially indigenous peoples. It also helps to reduce illegal trade, because those who possess these licenses—whether indigenous people, farmers, or cattle ranchers—have learned that they can reap legal economic benefits for each *yacare* skin harvested.

The evaluatory workshop revealed weaknesses in various technical aspects of the program—control and enforcement—as a consequence of the scale of the model implemented. However, the program has shown that it can help provide an important economic alternative for the different social actors involved. Currently the only one of its kind in Bolivia, this wildlife use program—in spite of its deficiencies—is demonstrating that it is possible to embrace activities that permit the conservation of wildlife and its habitat and at the same time provide economic benefits to local peoples. We now are entering the next phase of this national program: working to improve it. — James Aparicio E. & Jehan N. Rios, *National Museum of Natural History, Bolivian Wildlife Collections*, PO Box 8706, La Paz, Bolivia <iecbf@entelnet.bo>.



Brazil

AMAZONIAN CROCODILIANS: A KEYSTONE SPECIES FOR ECOLOGY AND MANAGEMENT...OR SIMPLY BAIT? Amazonian caimans, a keystone species in the Amazonian ecosystem which is a source of high quality, protein-rich meat and commercially valuable skins, are being used as bait to capture a fish that has had—until recently—almost no market value.

The first account of this type of use in 2000 from Mr. João Carvalho, a research assistant and a resident of the Mamirauá Sustainable Development Reserve in the state of Amazonas, Brazil. According to Carvalho, this practice has become widespread in at least two riverine villages located on the outskirts of this reserve.

Small-scale use of black caiman meat as bait to capture tortoises

(*Geochelone denticulata*)

was reported by Alvarez (1995) for Peru, but until recently we did not know of the wasteful use of this species as fish bait in the Brazilian Amazon.

Our concern increased when one of us (RDS) was told of this practice by Dom Alcimar Caldas Magalhães, Catholic Bishop of the Upper Solimões River Diocese, during the

“Participatory Planning Workshop for the Sustainable Development of the Upper Solimões River,” held in Tabatinga in August 2001. According to the Bishop, the use of caimans as bait was quite common in the region, and he was very concerned about the problem. Tabatinga, located on the borders of Brazil, Peru and Columbia, is about 500 km from the Mamirauá Reserve, and, therefore, indicates that the use of caiman as fish bait has become a widespread practice in the Brazilian Amazon.

Caimans are being used in this region to capture piracatinga *Calophysus macropterus* (Pimelodidae), a catfish species that reaches at most 40 cm standard length and weights of 300

grams. This species is distributed all over the Amazon basin, has a generalist diet, but it is best known for its necrophagous food habits (Ferreira et al. 1998; Silvano et al. 2001). It is common for the species to attack fish caught in gill nets, which is probably the reason its Portuguese name is *urubu d'água* (water vulture). Silvano et al. (2001) reported that local people usually do not eat this species, and our findings indicate that the piracatinga fishery is focused on the Colombian market.

The caimans are usually captured with harpoons and killed with blows of a club or an axe to the head (Da Silveira & Thorbjarnarson 1999). Following capture, the large caimans are chopped into pieces and the chunks of the body are used to attract the piracatingas to a cage made of wood or bamboo sticks. Small caimans are not chopped but opened to expose their entrails. The tail might be

removed to be sold or consumed by the fishing crew.

In some areas caiman pieces or carcasses are put into the cage, then the cage is completely immersed in the water and is pulled out after several minutes. The gap between the sticks is such that the small piracatingas are able to escape, holding only the

large individuals. One of us (JPV) witnessed piracatinga fishing last November in the Catuá region, approximately 150 km downstream from the Mamirauá Reserve. There were two kinds of traps used in this area: one made with hardwood and secured to the river bottom, and a portable cage made of bamboo. Both types had doors. To fish, a chunk of meat or a carcass held by a man's hand was shaken slightly outside the cage to attract the piracatingas (Figure 1). After a sufficient number of fish were attracted, the fisherman slowly lured the piracatingas into the cage. When the fish were inside, the door was closed and the man pulled the chunk of meat out of the water, leaving



Figure 1. Fisherman using carcass of Amazonian caiman to attract piracatingas to a cage in the Catuá region, Brazil. J.P. Viana photo.

the fish trapped inside. According to the fishers, the meat loses its capacity to attract piracatingas quite fast. They believe that the fish prefers the fatty tissues, and after this part is consumed, the remainder is thrown away, and the fishing continues with a fresh piece of meat or another carcass.

Four black caimans (*Melanosuchus niger*) and one spectacled caiman (*Caiman crocodilus*) were used during a fishing period that was followed from the beginning to the end. The largest caiman, an *M. niger*, was about 2.5 m total length. The other four animals were between 1 and 1.5 m long. The fishermen estimated that these caimans together weighed 100 kg, and the fishery yielded approximately 100 kg of piracatinga. Another fisherman said that a 3.5 to 4 m black caiman (approximately 300 kg) would yield 300 kg of piracatinga. Therefore, we can roughly assume that 1 kg of caiman yields 1 kg of piracatinga.

In the nearby town of Alvarães, formerly a trading center for illegal caiman meat, a kilogram of eviscerated piracatinga is sold by the fishermen to their patrons for R\$ 0.60-0.70 per kg (or US\$ 0.17-0.20 per kg). In this same place, a kilogram of salted/dried caiman meat was sold at US\$ 0.70-0.90 during the 1990s. Considering that *M. niger* is the most abundant caiman species in this region (Da Silveira 2002), we presume that this is the predominant caiman species used as bait in the area. The meat of the river dolphin *Inia geoffrensis*, a flagship species and probably a keystone species for the várzea floodplain ecosystem, is also being used in the same way, according to statements by Mr. Carvalho and Dom Alcimar.

A clue to the magnitude of this illegal and wasteful use of a noble species comes from one of the IBAMA's projects: ProVárzea. In Tabatinga, from May to December 2001, 140 tons of piracatinga were recorded by a monitoring system that belongs to a network of towns along the Amazon being monitored for fishery landings (see http://www.ibama.gov.br/provarzea/dbDownload/s/visualiza.php?id_arq=14). If one kilogram of caiman yields one kilogram of piracatinga as we estimated earlier, some 140 tons of bait were used in this fishery.

A centimeter of *M. niger* skin can reach a value of several dollars on the international market, but is being simply wasted. The solution

is management and sustainable use. A program aimed at the sustainable use of fishery resources under way for the past five years in the Mamirauá Reserve resulted in an increase of 400% in the stock of the pirarucu *Arapaima gigas* (the most important fish species for local communities and also considered threatened) and doubled the buying power of local villagers (Viana et al., in press). The potential for caiman use is much greater. Meanwhile, however, the resources for research, conservation, management and monitoring of crocodilians in the Amazon are diminishing.

We thank Rosa Lemos (WWF-Brazil) and Bill Magnusson for reviewing the manuscript. — Ronis Da Silveira, *Centro de Ciências Biológicas (CCB), Departamento de Biologia (DEBIO), Universidade Federal do Pará (UFPA), Belém-Pará, Brazil* <ronis@ufpa.br> & João Paulo Viana, *Instituto de Desenvolvimento Sustentável Mamirauá, Tefé-Amazonas, Brazil* <joaopaulo.viana@uol.com.br>.

French Guiana

POSSIBLE EXTENSION OF THE DISTRIBUTIONAL AREA OF BLACK CAIMAN IN FRENCH GUIANA. In French Guiana, black caimans are considered to be located primarily in the Kaw swamps, protected as a natural reserve since 1998 (Figure 1). In the past the species also was reported on the Mahury and Oyak Rivers in the west, and on the Kourouai and Ouanary River in the east (Plotkin et al. 1983; Medem 1983), but recent surveys revealed extirpation of the species in those areas due to past hunting pressures (Behra 1994; de Thoisy, pers. obs.). Only anecdotal sightings sometimes are reported.

An ongoing genetic study indicates a high diversity of the Kaw population of black caiman, and also suggests that breeders may be present outside the Kaw area (de Thoisy et al. 2002). Indeed, the use of microsatellite DNA revealed the existence of two metapopulations: one composed of caimans from the Kaw area and the second with animals sampled in the nesting sites of Mantouni and Aipoto Islands, in the Approuague estuary. Breeders nesting in these sites may not be those nesting in the Kaw area. Between the Approuague River and Oyapock River (Brazilian boundary), the Pointe Behague is a large (approx. 100 km²) and unexplored flooded savanna that is not accessible

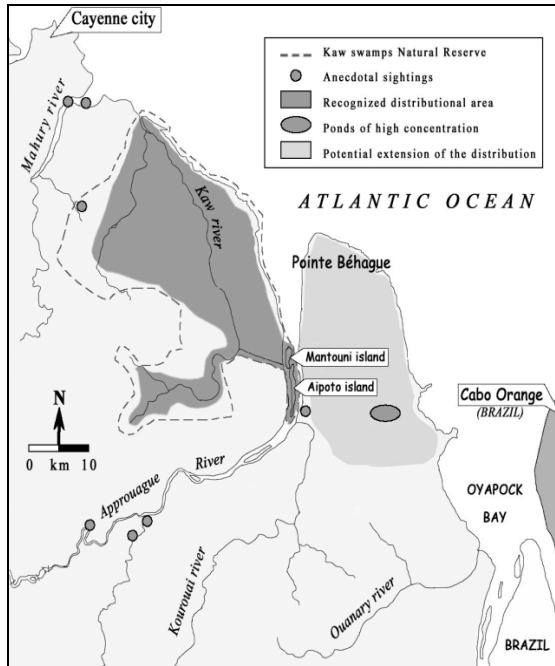


Figure 1. Kaw Swamps Natural Reserve, French Guiana.
A. Puthon map.

by land or water. A helicopter survey was conducted there in December 2002. The entire area seems to be a favorable habitat for black caimans, as it is quite similar to the Kaw swamps. Numerous black caimans (approx. 25 individuals, with a mean estimated total length of over 2.5 m) were sighted in two small ponds (< 1 ha). The survey was conducted at the end of the dry season, and no other open water area was located.

The survey was relatively short, and the entire site deserves more extensive work. Nevertheless, we may conclude that: (i) *Melanosuchus niger* distributional area in French Guiana may be twice as large as previously thought; (ii) the extension towards the west may suggest that the French Guianan population could be connected with that of Cabo Orange, Amapá, Brazil. A regional study and conservation program should be undertaken; genetic tools such as microsatellite DNA may help to assess populations structuration and/or cross-breeds; (iii) to date, the Pointe Béhague region is not legally protected. The passive protection is not fully adequate, and the newly assessed conservation value of this area may require the implementation of an active protection status.

We are grateful to the Direction Régionale de l'Environnement Guyane, French Ministry of Ecology and Sustainable Development, who funded the survey. — Benoit de Thoisy, Kwata NGO, BP 672, F-97335 Cayenne cedex, French Guiana <thoisy@kwata.org> & Emeric Auffret, Réserve Naturelle des marais de Kaw Roura, French Guiana.

Venezuela

EVALUATION OF OCCUPIED AND POTENTIAL HABITATS OF THE AMERICAN CROCODILE (*CROCODYLUS ACUTUS*) IN VENEZUELA. Between October and November of 2002, a team of scientists from the School of Science, Central University of Venezuela (UCV) and the General Directorate of Wildlife, Ministry of Environment and Natural Resources (MARN) evaluated the current and potential habitat of the American crocodile (*Crocodylus acutus*). The goal was to propose areas for the liberation and reintroduction of the species in Venezuela. Inside the historical distribution area of the crocodile, a total of 23 locations were visited. For habitat evaluation, two matrices were defined: one with favorable factors and another with negative factors. The favorable factors that allow the establishment of stable populations of the species were identified as the following: presence of mangrove or forest vegetation; presence of sandy beaches for potential nesting; affluence or predominance of fresh water; legal decisions favoring the protection of habitats; and presence of the species. Negative factors identified include: presence of tourist activity; presence of dwellings; agricultural activity; industrial activity; sailing; fisheries; and proximity to roads. The presence of the evaluated factors in each location meant a positive and a negative value for each matrix; its difference was calculated in order to obtain a final value. The locations with high values were identified as the most favorable for releasing and/or reintroduction of the crocodiles.

According to this evaluation, the coastal/marine areas that proved most favorable for release and reintroduction were Turiamo Bay, Gulf of Cuare, and Olivitos Marsh. The most favorable natural freshwater environments were the Tocuyo and Tucurere Rivers, while suitable artificial environments were the reservoirs of Játira,

Tacarigua, Burro Negro, and Cumaripa. — Alvaro Velasco, Gustavo Villarroel & Gregory Colomine, *Coordination of Extension-School of Science, Central University of Venezuela (UCV)* <velascoalvaro@tutopia.com> & Alfredo Lander, *General Directorate of Wildlife, Ministry of Environment & Natural Resources (MARN), Venezuela.*



CSG member John Thorbjarnarson (r) and his brother-in-law, Magni, checking local streams just outside of Husavik on a particularly warm day. No crocodilians were seen.

Europe

Iceland

FROSTY RESPONSE TO CROCS IN ICELAND. 12/2/02, Reykjavik - Iceland's government has refused to let a town import crocodiles to snap up fish factory waste and lure tourists to the North Atlantic island. Iceland's chief veterinary officer said last week he had advised the farm ministry against granting a request to import the reptiles by the small northern town of Husavik because crocodiles can carry salmonella. The Ministry of

Agriculture has in recent months been swamped with requests to import and farm exotic animals, such as ostriches, llamas and camels. — Allen Salzberg, *Publisher/Editor of HerpDigest* (12/15/02, Vol. 3, no. 16). Submitted by Wayne King, *Florida Museum of Natural History, P.O. Box 117800, Gainesville, FL 32611, USA* <kaiman@flmnh.ufl.edu>.

[Note: CSG member John Thorbjarnarson has been in Husavik and thinks that the crocodiles would most definitely thank the Icelandic government for its refusal of this request.]

North America

Mexico

[For this issue of the newsletter we have received two interesting notes concerning the northernmost distribution of American crocodiles along the Pacific Coast of Mexico. — *Editors.*]

CROCODILIAN REMAINS FROM THE LATE PLEISTOCENE OF NORTHEASTERN SONORA, MEXICO. The fossil record of crocodilians in Mexico during the Pleistocene is exceedingly rare. Of interest to us is a fossil-rich deposit from along the Río de Moctezuma, in mountainous, northeastern Sonora (29° 45'N lat., 109° 40'W long., 605 m elev.). Today the locality is dominated by a Sinaloan thornscrub community. The Río de Moctezuma begins just north of the town of Nacozari and flows south to join the Río de Bavispe and the Río Yaqui, which then empties into the Gulf of California immediately south of Guaymas, Sonora (Figure 1). The fossil lake deposit is situated adjacent to the village of San Clamente de Térapa, about 10 km south of Moctezuma.

To date, our work has concentrated on surface exposed fossils, and has already produced 39 vertebrate taxa. The precise age has not been established, but based on the recovery of the bison, it is likely to be within the past 500,000 years. During this time a lava-dammed Río de Moctezuma produced a short-lived lake (Lago Térapa, Lake Terapa). Fossils are recovered from the three sedimentary units of the lake deposit.

The structure of the sediments, their distribution within the basin, and the nature of the



fauna indicate the occurrence of a shallow paludal (marsh or swamp) environment, which we believe to be similar in structure to the llanos and pantanal (flooded grasslands and savannas) of South America. Areas within the Lago Térapi basin during this phase contain the tropical rodent, *Hydrochaeris* (capybara), along with grassland species such as *Bison* (bison), *Equus* (horse), *Glyptotherium* (glyptodon), and *Holmesina* (extinct giant armadillo, pampathere). A sedimentary facies contains well-sorted, coarse- to fine-grained sands and is consistent with a slow-flowing river channel within the paludal environment. This facies contains crocodilian teeth, snails, clams, and abundant fish and turtles. Other areas within the basin during this phase appear to lack what we interpret to be open water and contain remains of turtles, large tortoise, horse, deer, extinct pronghorn, xenarthrans (ground sloths and armadillos), and tropical birds (possibly representing near-shore and less submerged grasslands).

Six isolate teeth recovered from riverine-facies sands are distinctive to those found in crocodilians, and their sizes are indicative of at

least two different life stages. The teeth are conical and pointed to blunt-pointed; two of the teeth are slightly recurved (Figure 2). All the teeth have distinct vertical striations on the surfaces of the crown (a characteristic found on both crocodylids and alligatorids). Most of the teeth are weakly to strongly carinate (keeled) with crests oriented postero-mesially.

No crocodilians live today in interior northern Mexico or in the greater Gulf of California along the mainland or Baja California. *Crocodylus acutus* (American crocodile, cocodrilo del río) is the most widely distributed of the North American crocodiles. Its present distribution includes Altata (near Culiacán) and Mazatlán within the entrance to the Gulf of California (Ernst et al. 1999). Seri (Comcáac) Indians report the occasional sightings of a crocodile ("gila monster from the sea"—assumed to be *C. acutus*) as far north as Punta Sargento (the northernmost mangrove lagoon on the Sonoran coast), including two sightings recorded during the 1900s, with one large adult washed up on the southeast shores of Tiburón Island (Nabhan, in press; Figure 1). Baegert (1952) indicated seeing "alligators" of considerable size at the confluence of the Colorado River and the Gulf in A.D. 1751. These northern reports likely represent vagrant, range-exploring individuals and are recorded only along coastal waters and near-shore islands. We are not aware of any oral accounts or published literature indicating subfossil or historic records of any crocodilian being observed up-river from the Gulf of California in Sonora. Recent damming of major rivers (e.g., Río Mayo and Río Yaqui) for water storage and hydroelectric uses have all but completely decimated the coastal mangrove lagoons, removing these northern disjunct communities and thereby restricting the crocodile to the tropical south.

This tropical and mangrove lagoon species is distinctive to coastal brackish and freshwater habitats, though it is known to travel up major river systems (which is what we suggest to explain the arrival of a crocodilian at Lago Térapi; 350 km inland during the Ice Age). The alligatorid, *Caiman crocodilus* (common caiman) is a small, highly adaptable crocodilian that lives among other areas, along the Pacific Ocean coast of southernmost Mexico and Central America—the only other crocodilian today on the Pacific Ocean side of Mexico.

Reports of crocodilian fossils from the Ice Age of Mexico are rare in the literature. Two fragmented jaws, isolate teeth, a vertebra, and dermal scutes (osteoderms) recovered from the late Pliocene deposits of Las Tunas (> 2.0 million years ago) on southernmost Baja California were attributed to cf. *Crocodylus moreletii* (Morelet's crocodile; Miller, 1980). No verified accounts exist for natural *C. moreletii* population along coastal, western Mexico. These Pliocene-Age fossils warrant a new examination based on the identification and present distribution of that species. We suggest that the crocodilian at Lago Térapa was likely



Figure 2. Fossil crocodilian teeth from Río de Moctezuma, Mexico. J. Mead photo.

Crocodylus acutus, based on present distributions of the living species; however this remains uncertain until species-specific skeletal remains can be recovered. Our schedule for field seasons in 2003 is to concentrate in areas of the locality that will likely produce more crocodilian remains, which we hope will permit us to accurately identify the species of crocodilian. It appears to us that the recovery of these crocodilian teeth dating to the Ice Age in northeastern Sonora is unique.

We thank the personnel of the Cleveland Metroparks Zoo (Ohio) for their donation of the skeleton of Dreadnought, a 4.3 m long, +44 year-old male *Crocodylus acutus*. Such material for our comparative skeleton collection is critical to the teaching and researching of fossil crocodilians. — Jim I. Mead, *Dept. of Geology & Quaternary Sciences Program, Northern Arizona University, Flagstaff, Arizona 86011-*

4099, USA <James.Mead@nau.edu> & Arturo Baez, Dept. of Geosciences & College of Agriculture & Life Sciences, University of Arizona, 4101 N. Campbell Ave., Tucson, AZ 85719, USA.

CROCODYLUS ACUTUS IN SONORA, MEXICO. The American crocodile (*Crocodylus acutus*) is a widely distributed species, ranging from northern South America to the tip of the Florida peninsula and the Pacific coast of Mexico. In the latter, the mouth of the El Fuerte River (25° 49' N, 109° 24' W), in the state of Sinaloa, is considered its northernmost stronghold. However, there are historical accounts of American crocodile populations farther north in Sonora state, such as the report by Jesuit Father Juan Nentuig, who in 1764 wrote about crocodiles in the mouth of the Yaqui River (27° 21' N, 110° 30' W). Today, that area is much changed: as one of Mexico's biggest and most productive agricultural valleys, the river's freshwater flow has been reduced to such an extent that crocodiles are no longer found there. The same could be said of the mouth of the Mayo River, some 100 km to the southeast and where long-time residents still remember the *caimanes*.

Occasional individuals may have wandered away from those areas, as suggested by the capture of a crocodile on 19 January 1973 in the El Ciego estuary, near Las Guásimas, approximately 30 km east of Guaymas, Sonora (27° 52' N, 110° 33' W). This specimen was netted unintentionally by two fishermen who were night-fishing for seabass. From the photo published in *El Diario* newspaper the following day, the crocodile was estimated to measure approximately 2.5 m. Because that area does not have freshwater discharges, is located at the southern fringe of the Sonoran Desert, and receives irregular and scarce rainfall, it is unlikely that a breeding population of American crocodiles was ever established there. The surprise and interest that the event caused among local people is evidence that the species was not common then in the area. It may constitute the northernmost-recorded evidence of the species along the Pacific coast. Today, it appears that the species has been extirpated from Sonora. — Carlos J. Navarro, *Marine Biologist & Wildlife Photographer, Mexico <navarrosc@hotmail.com>.*

USA

EXOTIC PREY. Everglades National Park has a long history of exotics being released. Pet owners often turn loose their pets when they get too large for their enclosures. The latest encounter with one of these pets was observed on Sunday, 5 Jan 2003 at Anhinga Trail around 9:00 am at high season. Hundreds of visitors watched in amazement as a fairly large alligator played with a roughly 11-foot Burmese python for a FULL DAY! The snake escaped alive the following morning, approx. 19 hours after it was first noticed. — Submitted by Kenneth Krysko, PhD, *Collections Manager, Florida Museum of Natural History, Division of Herpetology, P.O. Box 117800, Gainesville, FL 32611, USA* <kenneyk@flmnh.ufl.edu>.

Science



CROCODILIANS SWALLOWING PREY UNDERWATER. The palatal valve in the back of a crocodilian's mouth is a unique adaptation that seals off the throat from both air and water. With the palatal valve shut, a crocodilian can grasp food underwater without having the water flood past into the esophagus or glottis. Crocodilians obviously prefer to keep the palatal valve closed while submerged, and come to the surface to swallow their prey. It is often assumed that crocodilians are unable to swallow food underwater, because of the overwhelming flood of water that would flow into their body. However, we have witnessed three species of crocodilian swallowing their food underwater. The first is a female freshwater crocodile, *Crocodylus johnsoni*, which was housed alone. On several occasions she has picked up pieces of meat from the bottom of the pool and proceeded to eat them without surfacing.

The second observation is of a female saltwater crocodile, *Crocodylus porosus*, housed with its mate. This female swallows both above the water and below, seeming to not have any preference for one or the other.

The most convincing observation has been a female *Tomistoma schlegelii*, which currently is housed in a large exhibit with another female and a male. This exhibit affords visitors a complete underwater view of the entire pool through four glass panels. Soon after moving the female to this exhibit, I witnessed her taking a piece of meat to the bottom of the pool and holding it. After about five minutes, she very deliberately opened her mouth (partially), then opened her palatal valve, and quickly moved her head forward and swallowed the meat. She remained in a resting position on the bottom of the pool for another ten minutes. Since she had recently come to us from the Audubon zoo, I called the reptile staff there and asked if they had witnessed this behavior. They said that they had: apparently, the male *Tomistoma* at this facility was in the habit of stealing her food if she surfaced with it. I have witnessed her swallowing underwater on one other occasion. Now, however, I believe the behavior is being extinguished by our training efforts, as our male does not have an opportunity to steal meat from the females.

I reluctantly included this subject in my talk at the 2002 CSG Working Meeting. I was sure that the crocodilian experts from around the world were going to say that this was a very well-known fact. But the only reference I found (Carpenter, C.D.H. 1928. Can crocodiles swallow their food underwater? *Nature* 122:15) is little more than guesswork on the part of the observer. Many CSG members came to me after the meeting and thanked me for mentioning this, as they too felt they had witnessed this behavior. Only one person said that they had actual video footage of a crocodilian swallowing underwater, but apparently it does happen with some frequency. — John Brueggen, *General Curator, St. Augustine Alligator Farm, St. Augustine, FL, USA* <JBrueggen1@aol.com>.



Publications



CROCODILES: BIOLOGY, HUSBANDRY AND DISEASES

by F.W. Huchzermeyer

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Trade



UK *OSTEOLAEMUS* SEIZURE. CSG was contacted in July 2002 and advised that on the 13th of the month, the UK Customs CITES Team had seized ten live African dwarf crocodiles (*Osteolaemus tetraspis*) at Heathrow Airport which were in transit from Nigeria to Korea. The shipment was accompanied with forged CITES permits. The consignment was supposed to be American alligators and Nile crocodiles, but they turned out to be African dwarf crocodiles, which are listed in Appendix I of CITES (banned from international trade).

Alison Littlewood, from the UK CITES Scientific Authority requested advice and assistance from CSG regarding repatriation, disposition, and care of these specimens. After a rapid e-mail consultation among interested CSG members, CSG recommended against attempting repatriation, but offered detailed recommendations for care of these animals. Below is a summary of these recommendations, excerpted from CSG's letter of response to Ms. Littlewood:

"We [CSG] recommend that you endeavor to locate bona-fide collections that would be willing to transport and house the animals for exhibit or research.

In terms of care, *Osteolaemus* are robust little crocs that should not need a great deal of care while in transit other than enough clean water to submerge in, access to dry land, and a heat source. In a pinch, the species is reported to be quite terrestrial and could be kept in a dry enclosure as long as they had access to drinking water. *Osteolaemus* make extensive burrows and therefore will probably be less stressed if given some sort of cover to retreat beneath. Temperature is important: to remain healthy, they will need to be able to get their body temperature up to 25-30° C. for a period of time every day. A heat lamp or heat pad should work. They will do fine without food for at least several weeks, but you could try to feed them fresh whole fish or chicken pieces supplemented with any commercial reptile

vitamin/nutrient additive powder. However, stressed wild captives often refuse to eat.

CSG Deputy Chair F. Wayne King recalled a similar seizure in the USA many years ago where all the crocodiles died shortly after seizure. The necropsy showed all animals to have large fish hooks embedded in their stomachs, causing infection and death. Apparently the animals had been captured by hook and the lines were cut, leaving the hooks within."

In light of this, we suggested that the UK authorities X-ray some of their crocodiles. Sure enough, almost all of the animals had hooks either embedded in their digestive tract or in their stomachs—apparently resulting from their method of capture in the country of origin (Figure 1). Four of the crocodiles died quite soon after being confiscated. Post mortems showed that the specimens had suffered from massive internal injuries caused by the hooks, and were directly attributable to the capture methods employed in the country of origin. The CSG Veterinary Group firmly recommended against surgical intervention to remove the hooks from the stomach cavities of the remaining specimens, suggesting that mortality under these circumstances was probably due to stress and low temperature inhibiting immune response, and that healthy warm crocodiles should be able to survive hook ingestion if the hook did not penetrate the stomach wall.

Acting upon these recommendations, the animals were given lavish care, minimal disturbance, extra heat sources and a course of antibiotics—and all appeared to be in good health. The animals have now all been placed with exhibitors and collectors in the UK and Europe in accordance with the requirements of the European wildlife regulations. — From correspondence with Alison Littlewood, UK CITES Scientific Authority, JNCC, Monkstone House, Peterborough, UK <Alison.Littlewood@jncc.gov.uk>.

DETERMINATION OF U.S. LEATHER MANUFACTURERS' PURCHASE INTENTION OF AMERICAN ALLIGATOR LEATHER. Leather is an important part of the textile and apparel industry, contributing billions of dollars in sales annually to the economy. Exotic leather, including American alligator, has increased in popularity. Alligator production, based on farming and trapping across the Gulf Coast region of the

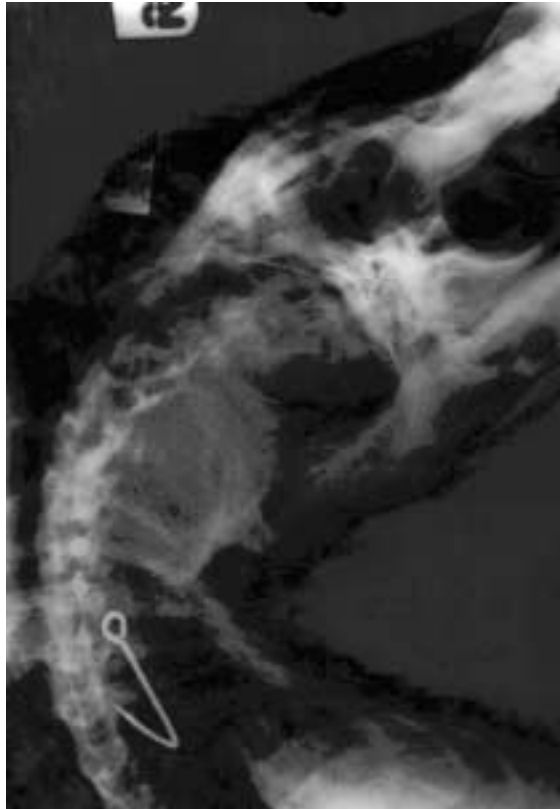


Figure 1. X-ray of *O. tetraspis* revealing hook embedded in stomach. A. Littlewood photo.

United States, now offers a consistent supply of hides, and a limited number of U.S. tanneries are now processing skins. Significant problems exist, however, in the development and expansion of the alligator leather industry. Foremost among these is the lack of knowledge and understanding of potential target markets in the U.S. Little research has focused on determining potential markets for alligator leather, and no studies of leather manufacturers were found in a literature review. Manufacturers play a critical role in transforming raw materials into finished products for the final consumer. The purpose of this study was to investigate leather products manufacturers' attitudes toward American alligator leather and their intent to purchase the leather for use in production. This project was part of a larger research study designed to enhance the domestic American alligator leather market. The Fishbein & Ajzen (1975, 1980) theory of reasoned behavior served as the theoretical framework to predict purchase intention (Fishbein, M. & I. Ajzen. 1975. Belief, attitude, intention & behavior: An introduction to theory & research. Reading, MA:

Addison-Wesley; Azjen, I. & M. Fishbein. 1980. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall).

A mail survey was conducted of a random sample of 2,200 U.S. manufacturers of leather products. A total of 446 surveys were returned with invalid addresses or from firms that did not manufacture leather products, and 467 usable questionnaires were returned, for a total response rate of 27%. Almost all manufacturers produced designer goods, and just over half produced moderately priced products using cowhide, sheepskin, pig, and goat leather. About one-fifth reported using exotic leather including alligator. Respondents said they sell their products to specialty stores, wholesalers, department stores, chain stores, and company-owned retail outlet(s). In general, respondents were aware of the physical properties of alligator leather and knew it carried a higher price tag than other leather. Though still a majority, fewer respondents had knowledge of the care characteristics of the leather or knew the American alligator was no longer listed as endangered. Most agreed that it was socially acceptable to use or wear alligator leather products and indicated they would not buy skins from endangered animals for use in products. Less than half agreed that manufacturing products with genuine American alligator leather would be a wise investment that was financially rewarding for their company. However, almost equal numbers indicated they wanted to use genuine American alligator leather in their products and would be willing to pay more for the leather. Regression analysis revealed attitude toward the product, social acceptance, subjective norm, and fashion orientation were significant predictors of purchase intention.

The model was effective in predicting purchase intention and supported the Fishbein and Ajzen (1975, 1980) theory of reasoned behavior. While purchase intention could be predicted, the number of manufacturers who expressed an interest in using alligator leather was low. This finding suggests the need for educational and promotional strategies to encourage manufacturers to use American alligator leather in their products. — Teresa A. Summers & Bonnie D. Belleau, *School of Human Ecology, Louisiana State University, Baton Rouge, LA 70808* <hcbell@lsu.edu>; & Yingjiao Xu, *Ohio University, Athens, OH 45701, USA*.

BOB-TAILED CAIMAN. Exports of farm raised caiman skins (*Caiman c. crocodilus* and *C. c. fuscus*) from Colombia to Europe and elsewhere have encountered occasional difficulties because of two reasons: short tails and stub tails. Some crusted skins have short tails, in which the posterior part of the tail is missing on the skin. Others have “stub-tails” in which the posterior part of the tail has been damaged or lost while the animal is alive, and is represented as a regrown stub, included on some skins.

Colombia has a self-imposed maximum size-limit for export (1.25 m), and when skins are at that size limit, but have the posterior part missing, it is obvious that the animal exported was larger than Colombia’s self-imposed size limit. With vast numbers of adults on the caiman farms in Colombia, it is to be expected that dead farm adults would be skinned and exported, a problem perhaps exacerbated in the past with some farms closing, and all stock, including adults, being killed and skinned. The major concern is clearly that such shipments could involve larger wild-caught stock “trimmed” so that they met the national size limit restrictions. There are thus genuine reasons to raise concerns with the Colombian CITES Management Authority about shipments of skins, at the maximum size limit, that only make that size limit because the tail has been trimmed.

Regrown tails are a different issue. They are reported commonly from wild caiman populations, where tails get damaged during social conflicts in natural, high-density situations. For example, Staton and Dixon (1975) reported that in a wild *Caiman c. crocodilus* population in Venezuela, the frequency of tail tip amputations increased from 20% to 50% as TL increased from 1.0 to 1.2 m. Some concerns were raised that amputations and regrown stubs on farm skins exported may indicate wild origin, but this would only be so if amputations and regrown stubs did not occur on farm animals. The opposite is the case. It is a common occurrence on caiman farms (see picture), perhaps affecting 20% of skins, and often leaving only 4-5 single caudal scutes intact on the tail part of the skin. So, regrown stubs are to be expected, and trimmed tails, especially in skins at or smaller than the maximum size limit, may reflect nothing more than a genuinely short tail!

During recent visits to Colombia, Grahame Webb observed several captive breeding operations, including slaughter of caimans for export. He noted that the occurrence of caimans with short tails in these absolutely legal captive



Babillas (*Caiman crocodilus*) at a Colombian farm showing naturally injured and shortened tails. G. Webb photo.

bred specimens is not unusual. All crocodilian farmers know that a small proportion of hatchlings are born with short tails and others get their tail tips bitten off by their pen mates. Infection and erosion in crowded pens can further shorten injured tails. The occurrence of shortened tails in both captive situations and in nature is a normal occurrence. Given the huge scale of some of the Colombian breeding operations that produce many thousands of specimens at a time, the occurrence of many short tailed specimens is to be expected. The accompanying photos show examples of short tailed caimans observed in captive production facilities in Colombia. It appears that the occurrence of shortened tails in either whole specimens or detached or processed skins is not a reliable indication of origin nor should it be assumed to be a result of attempts to manipulate skins to meet length requirements. — From material and correspondence submitted by Grahame Webb, *PO Box 530, Sanderson, NT 0812 Australia* <gwebb@wmi.com.au>.

Obituary

IN MEMORIAM: PROFESSOR DR. HEINZ WERMUTH (1916-2002). On 28 December 2002, Professor Dr. Heinz Wermuth, one of the world's leading herpetologists and a long-standing member of the IUCN Crocodile Specialist Group, died at the age of 84. Born in Berlin, he graduated from Humboldt University with degrees in zoology, botany, palaeontology and chemistry. His notable dissertation on the Pileus of the slow worm, *Anguis fragilis*—which resulted in the description of several new sub-species—was an early indication of his strong interest in taxonomic research. In 1952, he became Curator and Head of the Herpetological Section of the Zoological Museum in Berlin.

After World War II, Professor Wermuth was seriously affected, both personally and professionally, by the Cold War period. As a resident of West Berlin, he was deprived of access

to the museum and lost his work overnight after the establishment of the Berlin Wall in August 1961. Because he was offered a position as Curator at the Natural History Museum in Stuttgart, he was able to continue his research as Head of the Herpetological Section and, finally, as Head of the Division of Zoology. He retired from the Museum in 1983.

Heinz Wermuth never made a secret of his favorite taxonomic groups—turtles and crocodilians—which held his main scientific interests. He was a strong advocate of keeping reptiles as pets, and some of his publications as well as journal editorships reflect this scope. He kept an amazing assemblage of live specimens of turtles and crocodilians—of remarkable sizes—in his rather small government flat at the Museum. Among these specimens were a common caiman (over 2.5 m long) and a two foot-long American alligator.

To list the many scientific publications of Heinz Wermuth would be beyond the scope of this obituary. With regard to the objectives of the IUCN Crocodile Specialist Group, however, one of the most acknowledged books he published in co-authorship with Professor Robert Mertens must be mentioned here in detail. The book, "Wermuth and Mertens," was published in 1961 and reprinted in 1996 by Gustav Fischer Verlag in Jena. Based on a previous contribution to Volume 83 of the "Zoologische Jahrbücher-Abteilung Systematik" in 1955, this publication is the most comprehensive book on the taxonomy of turtles, crocodilians, and tuataras. By setting a completely new standard, it was also the first time that all known species of those three small reptilian orders had been documented by pictures. Furthermore, the book provided its readers with simple keys for identifying each species and, wherever possible, included drawings or pictures from the original scientific descriptions.

The reprinted version of 1996, which included the addition of an Appendix by Professor Fritz-Jürgen Obst on the nomenclatural changes since the first edition, is still as valuable today as the 1961 edition. This is also reflected by the fact that CITES has adopted this book as the standard nomenclature reference for these reptilian taxa.

In addition to his outstanding taxonomic work, it must be mentioned that Heinz Wermuth was a compassionate conservationist, particularly

and long before CITES came into effect, Wermuth pressured the German reptile leather industry (at the time among the most important consumers of crocodilian skins) for them to unilaterally put an import moratorium on crocodilians whose conservation status was in decline. His particular commitment to crocodilian conservation is also reflected in the form of his contributions as a co-author—with fellow long-standing CSG member, Karlheinz Fuchs—to the CITES Identification Manual's chapters on the identification of live crocodilians and their hides. Furthermore, he wrote numerous popular publications to draw attention to the important role the reptile leather industry could play in crocodilian conservation worldwide, as well as emphasize the fact that the utilization of this important resource can indeed become a reality.

Heinz Wermuth was a friendly, open-hearted scientist with a unique sense of humor, who honored with overwhelming charm any person he encountered. One person he regarded as one of his dearest and most esteemed friends was CSG founding member, Federico Medem, whom he was fortunate to survive for so many years.

It was a great pleasure and honor for me personally to work under Heinz Wermuth for several years. The scientific and crocodilian conservation community has lost an honest and remarkable ally. — Dietrich Jelden, *Bundesamt für Naturschutz, Konstantin Str. 110, D-53179 Bonn, Federal Republic of Germany* <Dietrich.Jelden@bfn.de>.

IN MEMORY OF HEINZ WERMUTH (1918 - 2002). For most modern crocodile specialists, international crocodile conservation starts with the founding of the IUCN/SSC Crocodile Specialist Group (CSG) and its first meeting in March 1971 at the Bronx Zoo, New York, and/or with the implementation of CITES 1973 in Washington, DC. However, it was already in 1956 that four eminent herpetologists sent out a memorandum to IUCN, urging the union to take steps "to prevent the extinction of all crocodile species." This document, also published in a German aquarium and terrarium magazine in 1956 (*Aqua-Terra* [Leipzig] 3:248-250), contained eleven proposals and was signed by P.E.P. Deraniyagala (Colombo/Sri Lanka), Fred Medem (Bogotá, Colombia), Robert Mertens (Frankfurt/Germany),

and the driving spirit behind it, Heinz Wermuth—then curator of herpetology at the Zoologisches Museum in Berlin, Germany.

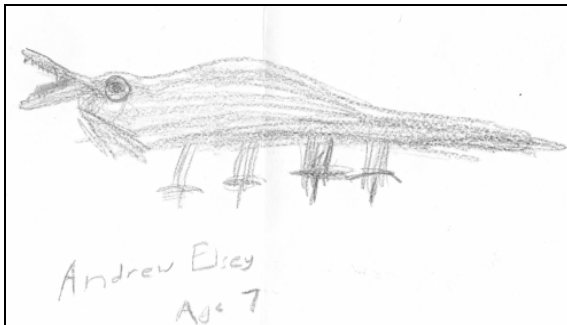
The passing away of Heinz Wermuth (Jan. 5, 1918 – Dec. 28, 2002) allows me to reflect also on the concentrated efforts of Heinz Wermuth prior to CITES(!) to bring together the German reptile leather trade and conservationists under the umbrella of the Frankfurt Zoologische Gesellschaft between 1972 and 1975. These tough negotiations ended in the voluntary self-restriction of the German reptile leather trade! The tribute for that success lies with Heinz Wermuth. — René Honegger, *Curator Emeritus, Zoo Zurich, CH 8044, Zurich, Switzerland.*

Personals

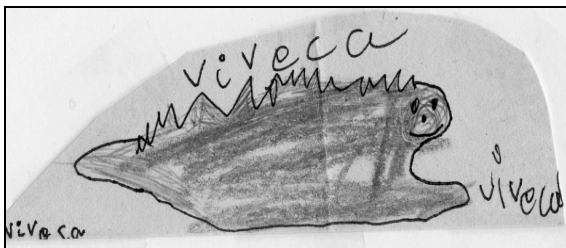


Below is artwork by Ruth Elsey's nephew Andrew (age 7), & niece Viveca (age 5). Ruth notes: "I'm sure Andrew's is an

alligator, but Viveca may have described a new species or a hybrid. Not sure exactly what it is, but the scutes look crocodilian!" — Submitted by Ruth Elsey, *Louisiana Wildlife & Fisheries Commission, 5476 Grand Chenier Way, Grand Chenier, LA 70643, USA.*



Alligator. A. Elsey drawing (age 7).



Crocodilian of unknown species. V. Elsey drawing (age 5).



This photograph was copied by Terry Cullen from a photo hanging on the wall of a bar in Key West, Florida. There is no data with the photo, but the clothing, setting and boat registration allow us to speculate that that location is in Panama—possibly Lake Gatun. The period (clothing) appears to be 1930-1950s. The crocodile is a very large specimen of *Crocodylus acutus*. Extrapolating roughly from the man's booted foot (visible center left), the animal appears to be approximately 16-18 feet long. Any additional information on this photograph should be sent to the editors. — Submitted by Terry Cullen, *Cullen Vivarium, PO Box 878, Milwaukee, WI 53201 USA.*



Tracks of a mugger crocodile in India. L.K. Singh has shown that the body size of *C. palustris* can be estimated from foot and tail tracks. *CSG News* 19(1):7-9. L.K. Singh photo.

BRIGHT CARPET, MIDNIGHT GLOW

The alligator's tapetum lucidum—
 "Bright Carpet," the reflective layer
Behind the retina—is brimming with guanin
 Crystals shimmering at night
Like they've taken fluorescent saffron to the lids.
An alligator eye is rimmed with yellow kohl
 Smacking of a subterranean philosopher
 who knows
One day he'll do his reflective duty, see the light.
 The eyes of adult males shine red.
Eyes of females and their young
Give off the greenish danger-glow
 Of the witch-fireball in Disney's
 Sleeping Beauty.
Hypnotising a princess to prick her finger.
Eyes, nostrils, ears fit laterally on the head
 high up
 To breathe, and detect their prey
When the whole beast's submerged, the third
 eyelid,
 A transparent nictitating membrane, shuts
Like a beamy visor. This is how an alligator
 protects itself
 And its slowly metabolizing brain.
 Scute pairs, rigid
Ferrules wrinkled up on dorsal armour, spherical
 bony plates
Straddling segments of vertebrae in declining
 size—
 We're looking at a living dinosaur
(From deinos, cognate with "daemonic dread
And power"), the oldest life form on the planet!
 Not that much evolution since the Late
 Triassic.
Behold our window on the world of ruling
 reptiles, and their eyes.

— Ruth Padel

[Poem reprinted with permission of author. We will feature more of Ruth's poems in future newsletters]



Requests

HEAD RESEARCH. Casey M. Holliday, of Ohio University's Dept. of Biological Sciences, is conducting his dissertation research on the functional anatomy of the temporal fossa & jaw muscles and their role in crocodilian & archosaur feeding evolution. Part of his work requires the dissection of heads of extant species, so he requires a range of species & ages for research. He has enough *A. mississippiensis* (thanks to R. Elsey, S. Reilly, & L. Witmer), but many taxa are still needed. Most important are *T. schlegelii*, *G. gangeticus*, *C. johnsoni*, *C. acutus*, *C. niloticus*, *C. porosus*, & *P. palpebrosus*. Heads of specimens may be injected, CT-scanned, dissected, & later skeletonized. Skull specimens & their accompanying CT-data sets either can be returned to the lender or will be housed in the Ohio Univ. Vertebrate Collections. Contact Casey at: <casey.m.holliday.1@ohiou.edu> or: Dept. of Biological Sciences, Ohio University, Irvine Hall, Athens, OH 45701, USA. Tel: (740) 597-1912.

NEEDED FOR RESEARCH: WILD-CAUGHT CROCODILIAN SPECIMENS. Kathryn Thomas, of the Dept. of Geology, University of California-Davis, is looking for wild-caught specimens of crocodilians—of any species—from a variety of latitudes. She will gladly provide letters or research proposals to research facilities & individuals who might be willing to lend specimens for this purpose. Please contact Kathryn by e-mail: <thomas@geology.ucdavis.edu> or: Dept. of Geology, University of California, Davis, One Shields Avenue, Davis, CA 95616, USA.

EDITORIAL POLICY - 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. 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 are not the opinions of CSG, the SSC, or the IUCN-World Conservation Union unless so indicated.

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

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