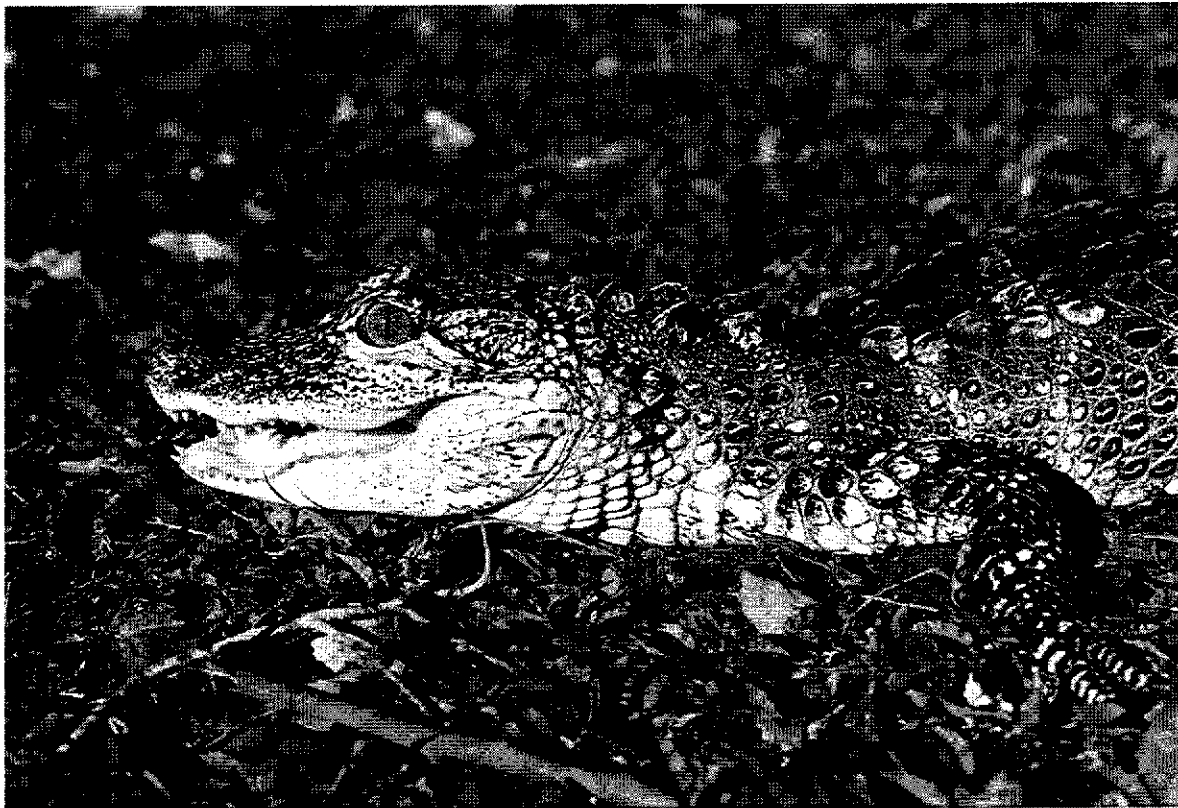


# **CROCODILE SPECIALIST GROUP**

## **NEWSLETTER**

VOLUME 16 No. 4 ■ October 1997 - December 1997



IUCN - World Conservation Union ■ Species Survival Commission

# CROCODILE SPECIALIST GROUP

## NEWSLETTER

VOLUME 16 Number 4  
October 1997 - December 1997

IUCN--The World Conservation Union  
Species Survival Commission

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COVER PHOTO: *Alligator sinensis*, captive  
adult female from the Bronx Zoo stock, ID #  
910261. Bruce Shwedick photo.

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

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## EDITORIAL

THANKS. Response to our appeal for additional funds to support the 1997 CSG program has been strong with an additional \$13,000 recently received from Patrons. We have also received substantial in-kind support. For example, several Mexican businesses supported the Villahermosa Regional Meeting, and Pronaturaleza, a Peruvian NGO, recently assisted a site visit by regional Vice Chairman A. Larriera (see report page 8). We

acknowledge this support in our Patrons list as well. Revenues for the year are now sufficient to meet 1997 expenses, and we can now concentrate on raising the necessary funding for the 1998 program!

This is, however, the nature of our normal fundraising process and ensures that we must keep services and effectiveness high to continue to attract the support of our donors. Thank you all for your continuing confidence. -- Perran Ross, Executive Officer CSG.

CROCODILE PHOTOS, TEN YEARS AFTER. The crocodile photograph on the Newsletter cover was introduced in Volume 6, Jan - December 1987 (P. Brazaitis and M. Watanabe editors) and has continued through the following 36 issues. Seventeen species have been featured with *Alligator mississippiensis*, *Crocodylus acutus*, *C. niloticus* and gharial illustrated most often. But five species have never been shown on our cover. These are: *Paleosuchus trigonatus*, *Crocodylus moreletii*, *C. novaeguineae*, *C. siamensis* and *Osteolaemus tetraspis*.

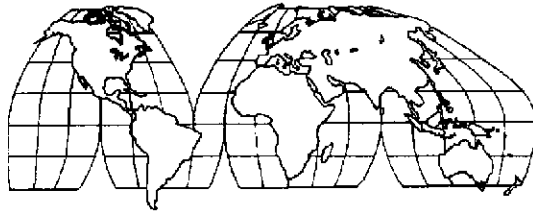
Did you forget?  
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current for 1998.

The cover photos on the Newsletter represent a widely accessible set of useful crocodile illustrations. Notwithstanding occasional misidentifications (see Vol. 15, Nos. 1 & 3), these are of general interest and taxonomic value. We therefore encourage readers to complete our coverage of the Crocodylia by submitting photographs of the missing species. Photos should ideally be good quality, well-focused, whole body or head-and-shoulders shots of adults which demonstrate the diagnostic characters of the species. Locality and date information should be included. We can accept images in any format and we will scan them to digital format for publication. Of course, we continue to need photographs of all species and any crocodylian related activities for the Newsletter.

Photographers are encouraged to retain copyright on their photos. Originals can be returned to the photographer or kept by CSG for use in other CSG publications. Photographers are always acknowledged by name. We also occasionally receive requests from commercial sources to use our pictures (textbooks, businesses,

etc.) and in the event that an image could generate any revenue for CSG, the photographer's permission is first obtained and equitable royalty sharing with photographers is negotiated. Readers should also see the on-line Croc Photo Gallery at our **CSG** **web** **page** <http://www.flmnh.ufl.edu/natsci/herpetology/crocs.htm> -- *Editors.*

## AREA REPORTS



### AFRICA

#### **Ethiopia**

**LAKE STEPHANIE CROCODILES.** In southern Ethiopia there is a seasonal lake known as Lake Stephanie or Chew Bahir. This is a seasonal lake and the southern portion extends into Northern Kenya and lies east of Lake Turkana. Lake Stephanie is fed by a river that flows into the lake from the north. This river lies parallel to the Omo River which flows into neighboring Lake Turkana.

Along this river the water is used for irrigating cotton and sugar-cane. There is a population of Nile crocodiles. A researcher who was in the area in early 1997 photographed a 3 m. long Nile crocodile that had been harpooned (I also personally saw this photograph). Crocodiles are killed whenever they are sighted along this river which is quite shallow and wide. The locals do not tolerate the crocodiles and it seems their future is threatened along this river. -- *Submitted by P. S. Soorae, IUCN/Re-introduction Specialist Group, African Wildlife Foundation, P.O. Box 48177, Nairobi, Kenya. E-mail: <PSoorae@awfke.org>.*

#### **South Africa**

**MYSTERY DISEASE IN KRUGER PARK.** An increase in seemingly sick crocodiles has been found in the Olifants river. The symptoms are a dramatic loss in weight, the crocodile becomes inactive and tolerates the presence of humans to within a few meters. It tends to stay in the very same place

with little detectable movement. After about 4 - 6 weeks it normally dies. The loss in condition results in a very prominent head and the tail flops to one side - it is not upright as in the case of healthy crocs.

The number of sick crocodiles reached a peak in May with 8 crocs in a 21 km stretch of river. Total population for this area is about 500 individuals; the number fluctuates with the seasons. Only one carcass has been found and signs and tracks indicate that the rest were presumably all eaten [by other crocodiles, predators, etc. - *Eds.*].

Permission was obtained to sample one sick animal, and the following analysis were done on kidneys, liver and a piece of rib:

Calcium (Ca)	-	205.5	ppm
Phosphorus (P)	-	97.0	ppm
Copper (Cu)	-	6.0	ppm
Fluorine (F)	-	0.88	ppm
Iron (Fe)	-	16,593.8	ppm

Information on crocodile blood values is not easily available to us but these values fall close to expected normal veterinary values, except for the iron which is very high. This seemingly very high iron concentration prompted further investigations and a total of 5 healthy crocodiles of various sizes were collected. Two additional individuals from another river, the Sabi, were sampled as well to act as a benchmark for the Olifants river. The analysis includes: blood samples; tissue of liver, kidney, lung, spleen, muscle, bone and fat; pentastome loads and parasite infections. The results are not available yet, but anyone with any related information is asked to contact me via e-mail at <swannie@ns.lia.net>. The crucial thing is to obtain some comparative values for different parameters in crocodiles, i.e. blood, heavy metals, minerals. -- *D. Swanoepoel, P/Bag X402, Skukuza, 1350, Republic of South Africa.*

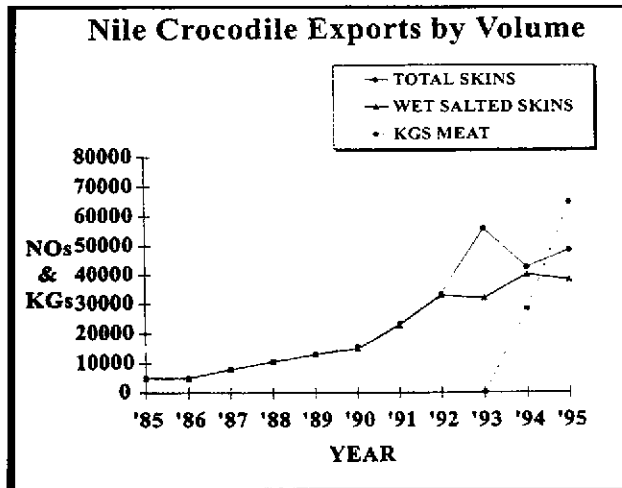
#### **Zimbabwe**

**REVISED MANAGEMENT PLAN FOR CROCODILES IN ZIMBABWE.** The Nile crocodile, the only crocodile species in Zimbabwe, has a high economic value through the development of ranching. In 1983, Zimbabwe became the first African nation to have its conservation efforts recognized through its sustainable use program and the crocodile

population was transferred to Appendix II. The Scientific and Management Authorities (both within the Department of National Parks and Wildlife Management) have recently worked with the crocodile industry and CSG to update the Management Plan for Crocodiles.

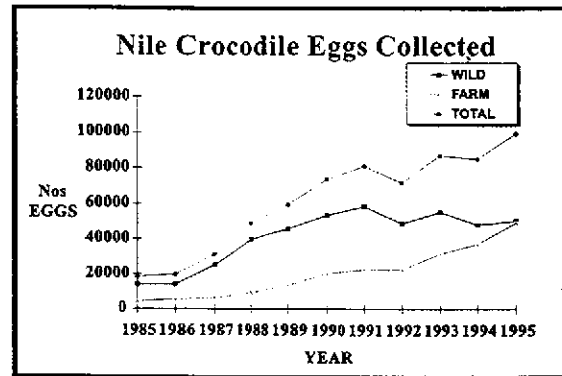
The reviewed Management Plan is based on the following policy considerations:

- The continued conservation of wild populations.
- The reduction of conflict between crocodiles and people.
- To promote conservation through sustainable use.



- To enhance economic opportunities to communities through education and activities related to crocodiles.
- The continued cooperation between Government, the industry and stakeholders to achieve objectives.
- To provide legal force to policy objectives
- To promote international liaison on shared water bodies.

In Zimbabwe, crocodiles were first given a measure of protection in 1961, and, in anticipation of the human-crocodile conflict, emphasis was placed on sustainable utilization to give the wild crocodile population a value. Since the 1960's the Department of National Parks and Wildlife Management (DNPWLM) has promoted crocodile ranching. The Department instigated the formation of the Crocodile Farmers Association of Zimbabwe (CFAZ), which has been extremely important in the development of crocodile farming and ranching. By 1996, the value of this industry was in excess of US\$ 5 million from the sales of hides and, more recently, meat.



Utilization of the Zimbabwe crocodile resource begins with the issuing of quotas and permits by DNPWLM, which originally issued egg collection permits to members of CFAZ, but now does so to any suitably qualified individual or association. An increasing number of producers also keep breeding stock obtained from either problem animal control or growing juveniles to maturity. There are currently 2,800 breeding crocodiles in Zimbabwe. Since 1987, DNPWLM has allowed farmers virtually unlimited collection of eggs which is coupled with a release of 2% of the resultant juveniles at two years of age in a program of reinforcement of natural populations which ensures sustainability. This reintroduction exercise has been monitored through government led research which, together with the analysis of annual egg collection data, allows effective monitoring of the effects of the wild harvest on the population. The new management plan also assigns the responsibility for independent monitoring to DNPWLM.

Financial remuneration for wild eggs collected on communal lands is paid to Rural District Councils under the CAMPFIRE program, or to DNPWLM for eggs from state lands. Overall, half a million Zimbabwe dollars was returned to these authorities for the 1996 egg collection, providing substantial local benefits and incentives to conserve crocodiles. Crocodiles also receive complete protection in protected areas and reserves.

Crocodile ranching in Zimbabwe is an excellent example of the close cooperation between government and the private sector that is largely responsible for the highly successful wildlife industry and secure crocodile population found in Zimbabwe today. -- FROM 'POLICY AND PLAN FOR CROCODILE MANAGEMENT IN ZIMBABWE' & Brochure, Ministry of Environment and Tourism, Department of National Parks and Wildlife Management, Harare, Zimbabwe.

## WESTERN ASIA

### Bangladesh

**GHARIAL RESIGHTED.** After a lapse of almost six years, a gharial (*Gavialis gangeticus*) has been sighted in the lower stream of the river Padma in Bangladesh. Gharial used to live in the Padma, Jamuna and Old Brahmaputra rivers and their tributaries. However, gharial faced near extinction in Bangladesh due to accidental capture in fishing nets, loss of flow of water in the River Padma, destruction of nest sites by villagers and accidental capture of juveniles by fishermen. The last officially recorded sighting of gharial was at Gaibandha district in 1991. Two baby gharials were caught by fishermen in the Teesta river and given to the Dhaka Zoo.

In October 1997, a 3-foot long juvenile gharial was caught in a fishing net at a place called Maluchi, Shivalaya police Station, Manikganj District, about 80 km west of Dhaka. A Dhaka based Non-Governmental Organization - Nature Conservation Movement went to Maluchi on 17 October 1997, and the Director, Anisuzzaman Khan, collected the dead specimen from the fisherman.

Additional information comes from a survey of river dolphins which revealed five new sightings by fishermen between Bhuapur, Sirajganj and Aricha. Sightings have also been confirmed from the Padma between Nagarbari and Lohajang. One involved a gharial killed at Taota and another was collected for the Dhaka Zoo in Munshigani. A third was killed in Kadarntali on the Padma river in October 1997 and two were reported between Nagarbari and Harirampur.

While this demonstrates that gharial still occasionally occur in the rivers of Bangladesh, no practical surveys have been made due to lack of funds. If funds were available, a first step would be to conduct surveys at the low water season from December to March when gharial locations could be visited by shallow draft boats with power pumps. -- M. Reza Khan, *Head of Zoo Section, Dubai Zoo, P.O. Box 67, Dubai, United Arab Emirates, with additional information from Inside Sanctuary, Vol XVII No. 6 December 1997:63-64 submitted by Grahame Webb.*

[*Editors note.* We are excited by this sighting and note that the locality lies at the conjunction of the Ganges and Brahmaputra river systems. The juvenile gharial reported may well be from any of

the numerous localities reported upstream in India and Nepal, many of which continue to conduct release programs of captive raised gharials. It seems possible that the re-introduction programs may have successful results far from their original release sites and a regional perspective on gharial conservation is needed.]

### India

**POISONING KILLS CROCS IN SUNDARBANS.** Poachers are using lethal poison in rivers and canals in the Sundarbans to catch shrimps, crabs and other fishes. Reports suggest that as the poisonous water mixes with the current towards the sea, it kills fishes, baby crocodiles, snakes and many other aquatic creatures until it gets diluted in the big river. Use of such poison has been so rampant that the ecology of some areas in the Sundarbans have now come under threat, authorities there said.

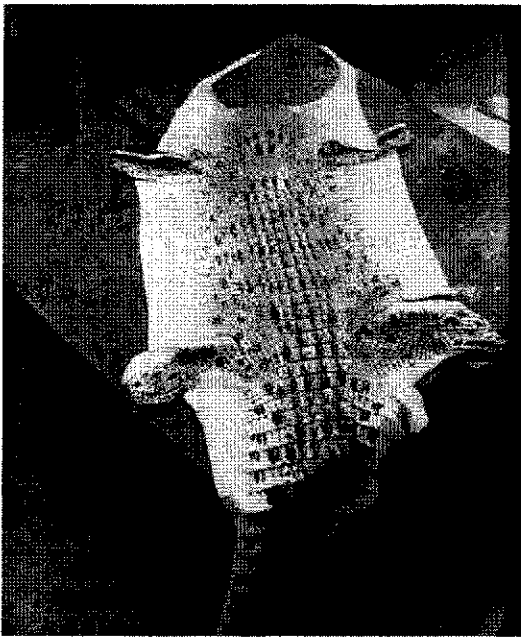
"I caught some people red-handed recently with bottles of poison from the river," said Habibur Rahman Khan, Deputy Ranger and Station Officer of Dhaingamari forest office. "But the culprits were released because we failed to provide the court with a test report on the fishes they had caught." Explaining how the poisoning is done, the ranger said the poachers use a poison called "RIBCOT", contained in a bottle similar to that of a cough syrup. "They spray a few drops of this lethal liquid into the canal and within minutes all types of shrimps and crabs start crawling up the shores in a bid to escape. The poachers quickly pick their catches and disappear into the vast network of canals of the mangrove. Within half an hour, fishing is complete. Other fishes get washed away in the current, dead or dying. The poachers are more interested in shrimps and crabs for their high prices and easy sale," he said.

Some fishermen queuing in the Dhaingamari forest office to get their fishing licenses renewed told this correspondent that the poisoning has become so rampant these days that they are hardly getting any fish. Forest officials at Karamjal Forest Patrol Post under Chandpai Forest Range also complained about poaching by poisoning. "This problem exists in many parts of the forest," said an official. If confirmed, such developments can have serious implications for the Sundarbans ecosystem on both the Bangladesh and the Indian sides. -- By Morshed Ali Khan, *DAILY STAR, Dhaka, January 10, 1998*

# ASIA and OCEANIA

## Australia

EXPERIMENTAL CROCODILE HUNTS IN NORTHERN TERRITORY. For the first time since their protection in 1971, saltwater crocodiles in Australia's Northern Territory are being legally hunted. The 'trial harvest' is part of an extensive training and management program for Aboriginal landowners surrounding the Maningrida community in Arnhem Land, 400 km east of Darwin. In September, special permits granted by the Territory and federal governments allowed aboriginal residents to harvest crocodiles from their four river systems and sell the skins internationally.



A 16 inch wide hornback hide of *C. porosus* on board the MV. Crocodilo, taken during the first phase of crocodile hunting in northern Australia during the 1960's. Photo supplied by Terry Selwood, Marine Leather Exports, Cairns, Australia.

Participating in the capture of the first crocodile was Dean Yibarbuk, traditional owner of a section of the Tomkinson river where the harvest is being tested. His clan and three others- more than 60 people- will share the proceeds from the skin and meat. "It will enable us to become self sufficient," he says. "We want economic independence for our people. The only way we can do that is to make money from our land." Killing crocodiles is not a decision taken lightly among the Maningrida clans. The saltwater crocodile embodies a deep spiritual significance

and there is disagreement among the clans over the harvest. "We respect the crocodile, especially the old ones," he explains. "They are in our song cycles and dances. It's an animal from the creator." It is for this reason that clan elders allow no older crocodile (over 2.5 m) to be taken during the trial.

Back in Maningrida, 13 aboriginal trainees receive instruction on the techniques for skinning a crocodile to attract the best price. "We are ensuring the people have the right training," explains Bill Freeland, Executive Director for the Parks and Wildlife Commission of NT. "Equally important, we want to see them taking the responsibility for management of those resources. We would like to see them taking on the ongoing assessments of the crocodile population."

The Bawinanga Aboriginal Corporation has collected crocodile eggs from their rivers for a decade to supply Australia's crocodile ranching program. Last year the Aboriginal and Torres Strait Islanders Commission funded an incubator, enabling the group to sell live hatchlings for greater profit than eggs. "The incubator cost \$20,000 but we've already made more than that from hatchlings," grins Bawinanga project coordinator Ian Munro.

However, Australia's protectionist environmental movement opposes the Territory's commercial use of wildlife and is gearing up to fight the government's expansion of these programs. The Maningrida trial harvest and training program has been placed on hold. Opposition from other community clans on cultural grounds took precedence

over economic considerations and the project's future is in limbo. The six animals taken in the trial could be the last.

Undeterred, the NT Parks and Wildlife Department's second trial crocodile harvest is underway on private lands at Swim Creek station where manager Alan Fisher has requested culling a sustainable number of large crocodiles. Fisher wants to harvest crocodiles directed at an annual harvest of crocs which attack his stock. The population will be counted then a number of larger crocodiles removed. "I don't believe in shooting

anything that will be wasted," says the pastoralist. "But if he puts money in your bank account and his hide covers our stock losses, we will make sure these crocodiles are protected and nobody will mess with them." -- adapted from *THE AUSTRALIAN MAGAZINE* December 1997. Submitted by Professor H. Messel, School of Physics, University of Sydney, Australia.

## China

**CONTROL OF DISEASE IN CAPTIVE HATCHLINGS OF CHINESE ALLIGATOR.** A large number of hatchlings at Anhui Research Center of Chinese Alligators (ARCCAR) were subject to disease and death and their survival rate was difficult to improve in recent years. The development of this circumstance seriously limited the expansion of the total number of captive alligators. In view of this, we conducted a study of the disease in Chinese alligators. As a result we have cleared up the cause of disease, gained practical experience treating disease and can now control disease in hatchlings.

resistance to other diseases, such as bacterial infection. The symptoms of the nematode infestation are loss of appetite, emaciation and an enlarged abdomen. These symptoms were present in the early stages of alligator farming, but were so unusual that the cause was not investigated.

To control this disease, enforced hygienic management and treatment with a vermifuge is used. Controlled environment chambers and stocking tanks used to raise hatchlings are disinfected strictly before introducing the neonates and instruments and water are also disinfected. But the key to treatment is use of a vermicide. This is applied generally for a month then the hatchlings are examined and any showing continued infection are separated and given intensive vermifuge treatment and nutritional and vitamin supplements. After adopting these techniques, morbidity and mortality of hatchlings were greatly reduced and survival raised to over 95%. -- Wang Ren-Ping, Anhui Research Center for Chinese Alligator Reproduction, Xuan Zhou City, Anhui, People Republic of China.



*Alligator sinensis*, captive female, part of the US zoo breeding program. Bruce Shwedick photo.

Young hatchlings up to three months age were most subject to disease, which may persist until two or three years age and greatly reduce survival. Therefore, controlling disease in the youngest alligators was the key to improving survival. Our studies indicate that the primary cause of neonatal disease was a nematode parasite. These parasites live in the alligators stomach and damage the stomach membrane so that the digestive function is impaired. With insufficient nutrition the animals exhaust their body energy and lower their

## Thailand

**SEARCH FOR CROCODILES AT TARUTAO NATIONAL PARK.** The Thai people have traditionally regarded crocodiles as evil. Folk tales abound casting them as antagonists to be defeated. The most famous of these legends is the tale of Chalwan, who could change himself from a crocodile into a man and would abduct young women and spirit them off to his undersea cave.

It fell upon the hero, Kraitong, to kill him and rescue the maidens. In reality, however, it is Thailand's crocodiles who need rescuing.

Both Siamese (*C. siamensis*) and estuarine (*C. porosus*) crocodiles have been functionally extirpated from the country although small remnant populations may persist. Koh Tarutao is a rocky island located in the Andaman sea near the border of Thailand and Malaysia. It is the largest of a small group of islands now forming the Tarutao National Park which encompasses 1,490 km<sup>2</sup>. Tarutao is the site of persistent recent crocodile reports.



A survey team worked at Tarutao from 15 - 18 July 1993 and 20 - 30 January 1994. During the first period, the team familiarized themselves with the island, and during the second, night spotlight surveys were undertaken by boat and daytime searches for tracks and basking sites conducted. A total of 15.6 km of mangrove channels around the island were surveyed.

Although abundant other wildlife was sighted (civet cats, otters, macaques and monitor lizards) no crocodiles or crocodile sign was seen during the survey. Two recent reports of crocodile sightings were obtained but could not be confirmed by first hand observers. The general impression, however, was that the island's mangroves and inland areas are eminently capable of supporting crocodiles. It is also possible that migrant crocodiles pass through the island from populations in Myanmar and Malaysia, or escapees from a crocodile farm on Langkawi island, just 5km distant across the Malaysian border. Even if these speculations prove false, reintroduction of crocodiles is possible. The only potential pitfall to a reintroduction would be the attitudes of the local people, who still regard crocodiles as a nuisance species. -- Adapted from Schaedla, W., L. Nachbar, A. Mauric, S. Settle & D. Marsh. 1997. *A Search for Estuarine Crocodile at Tarutao National Park, Thailand. Tigerpaper* 24(3):1-8.

## LATIN AMERICA

### Peru

INSPECTION OF CROCODILE MANAGEMENT. Between 8 and 11 December 1997, a CSG team headed by Alejandro Larriera, regional Vice Chairman for Latin America, visited Peru and inspected crocodile facilities in the Tumbes region of northern Peru. The visit was prompted by contacts established with PRONATURALEZA, a Peruvian NGO, in April and discussions with them about concerns for crocodilian conservation in the country. This resulted in an invitation from PRONATURALEZA and the Peruvian fisheries development agency, FONDEPES, for a CSG visit. The CSG team, consisting of Alejandro, CSG member Ana Maria Trelancia and Executive Officer Perran Ross arrived in Lima and traveled directly to Tumbes. There the team met up with CSG member Pedro Vásquez Ruesta who is conducting surveys in the region, and held

discussions with PRONATURALEZA and FONDEPES regional staff. The team then inspected facilities established for the future farming of *C. acutus*, made a brief inspection of crocodile habitat and the Tumbes National Mangrove Sanctuary, a protected area of over 4,600 ha. The team then had discussions again with staff of agencies active in the area and returned to Lima for a final discussion with PRONATURALEZA, The Director of Aquaculture of FONDEPES and the Director General of Protected Areas in the wildlife agency, INRENA.

Available information, including recent spotlight surveys in the Tumbes coastal zone by Pedro Vásquez, indicate that the population of *C. acutus* is greatly diminished and may number no more than a few non-hatchling individuals. Crocodile habitat in the area has been extensively altered by the destruction of mangrove for the development of large impoundments for shrimp aquaculture. Additional problems appear to accidental capture in gill nets and exclusion of crocodiles from key habitat areas such as fresh water sources and nesting areas. The status of the population of *C. acutus* reported to occur upriver in the Rio Tumbes is poorly known, with no recent surveys.

Following a recent Presidential directive, two government agencies, FONDEPES (Fisheries) and INRENA (Wildlife) have initiated programs for the captive propagation of crocodilians. Twenty two *C. acutus* captured from the Tumbes estuary are held in a small facility near Tumbes. One of these is an adult female, 2 subadults and the remainder juveniles. A second facility is in the early stages of construction at the Tumbes Mangrove Sanctuary and holds no animals. In Iquitos in the Peruvian Amazon, a small facility has been constructed on a military base which is holding a small number of *Caiman crocodilus*. These facilities share in common small size, very basic construction and minimal technical expertise. Nevertheless, the personnel in charge are eager to improve their technical competence and facilities.

After inspecting this situation and discussions with all the principle agencies and individuals concerned, the CSG team generated the following recommendations:

The only justification for a crocodile farm in Tumbes is to generate animals for the recuperation of the local wild population, which is in a perilous status. The crocodile population appears to be insufficient to support direct commercial use at

this time. The team recommended that no additional animals be captured from the Tumbes estuary and that the objectives of the operation be re-oriented toward functioning as a center for education, public display, and ecotourism. The Mangrove Sanctuary should be evaluated as a site for the re-introduction of *C. acutus* from captive stock. An existing PRONATURALEZA project for the sustainable management and multiple use of the mangrove ecosystems of the Tumbes region should coordinate activities with shrimp and fishing industry representatives to reduce the current negative impacts on the crocodile population and habitat. This could be combined with an analysis of the potential for the development of ecotourism (currently underway) to include viewing crocodiles in their natural habitat.

In conversation with the manager of the Iquitos facility, the dubious economic feasibility of small scale captive breeding of caiman was noted and a suggestion made that the facility should convert to holding *Melanosuchus niger*. The feasibility of ranching *M. niger*, which still occur in the Peruvian Amazon, in conjunction with community development projects, was discussed.

These recommendations were developed against the background context of the urgent need for a national strategy for crocodylian conservation in Peru which would coordinate the activities of the several participating agencies, academics and private groups. Such a strategy would assess the status of the five species of crocodylian that occur in Peru and apply appropriate management and conservation strategies to each. The team considered that Peru has a great potential to develop such a national strategy which would address the needs for economic development and community participation and also assure the survival of crocodylians and their habitat in the long term. To achieve this objective it will be necessary to implement management actions appropriate to each species and to define the responsibilities of the participating players.

To initiate this process the team recommended that PRONATURALEZA consider convening a national workshop in 1998 with the participation of government, academic and private sectors and the assistance of regional expertise from the CSG. We were impressed by the openness of all the groups and agencies we met to our suggestions and look forward to continued cooperative development of crocodylian conservation in Peru.

The team wishes to express its thanks to PRONATURALEZA and FONDEPES, who supported the participation of A. Larriera in the visit; and all the numerous collaborators, technical personal, new friends and collaborators who assisted our trip. -- A. Larriera, *Vice Chairman for Latin America and the Caribbean*, Bv. Pellegrini 3100, Santa Fe-3000, Argentina, J. P. Ross, *Executive Officer CSG & Ana Maria Trelancia*, c/o L. Alcazar, Proctor & Gamble, Av. Pardo y Aliaga 695, Lima, Peru.

## CENTRAL AMERICA and the CARIBBEAN

### **Belize**

**AMERICAN CROCODILE IN BELIZE.** The American crocodile (*Crocodylus acutus*) is one of two species of crocodiles which occur in Belize, being found on offshore cays and atolls and in mainland coastal habitats. *C. acutus* was nearly extirpated from Belize between 1940 and the late 1970's by intense overexploitation for skins. Legal protection was afforded by the Wildlife Protection Act of 1981 and the closure of the international market by CITES. The objectives of this study were to assess the status of *C. acutus* in the coastal zone, identify populations that would benefit from protection and provide conservation recommendations to enhance recovery and ensure the maintenance of viable populations in Belize.

Spotlight surveys were conducted throughout the coastal zone from July 1996 to October 1997. A total of 263 crocodiles were observed along 956.9 km of survey route (0.27 crocodiles/km). In general, the highest densities were found in the Turneffe Atoll and somewhat lower densities on most cays. Low densities were also found on Ambergris Cay, and Bacalar Chico National Park is the only protected area where significant numbers of *C. acutus* occur. American crocodiles were extremely rare on the mainland and most observations were of subadults, which probably represent dispersing individuals, rather than an established population. *C. acutus* does not occur in any inland freshwater habitat, but is instead replaced by the more abundant Morelet's crocodile.

Only 16 nesting areas were located. Forty-one (70.6%) of the 58 nests examined during this study were found in the Turneffe Atoll. The largest site

was a beach on the Northern Cay, Turneffe Atoll, where 10 nests were found in 1997. Four additional nesting sites were identified on Blackbird Cay, Turneffe Atoll. Elevated beach ridges are the preferred nesting habitat in Belize. These ridges are the most endangered habitat in the coastal zone and are also frequently used by nesting sea turtles. Shallow brackish lagoons were located adjacent to two nesting beaches and provide essential nursery habitat for hatchlings. Colonial nesting occurred at five of the 16 sites, indicating suitable nesting habitat is a limiting resource.

Fourteen crocodile nests containing eggs were found. Mean clutch size was 22.3 and mean clutch mass was 1.8 kg. These values are among the lowest reported for the species. Growth data obtained in this study indicate that growth rates are likewise among the lowest reported. Diminished reproductive output and slow growth rates are thought to depress recruitment among the American crocodile population in Belize.

The largest population occurs on Turneffe Atoll. This population plays an important role in regional metapopulation dynamics, serving as a source for *C. acutus* on other cays and the mainland. We estimate approximately 250 non-hatchling crocodiles, including 20-30 breeding females are present on the Atoll. Using density estimates based on the area of mangrove habitat, an additional 370 crocodiles are believed present on the cays and 272 on the mainland giving a country-wide population estimate of only about 900 non-hatchling American crocodiles.

While crocodiles are legally protected, opportunistic killing and drowning in monofilament nets removes small numbers from the population each year. Habitat destruction, especially development on nesting beaches and associated nursery habitat is the greatest threat to the continued viability of *C. acutus* in Belize. Because beaches often represent the only elevated ground on the cays they are highly sought for fishing camps and tourist resorts. Preservation of beach ridges and nursery habitat is, therefore, the single most important element of American crocodile conservation in Belize.

The results of this study indicate that *C. acutus* has not recovered from past exploitation and the status of the population remains tenuous. Continued protection and classification as an endangered species in Belize is warranted. The American crocodile, together with sea turtles and manatees, should be considered a flagship species

essential to the preservation of critical coastal habitats. Detailed recommendations regarding areas for protection, restriction of monofilament nets, promotion of crocodiles as an ecotourist attraction and public education are given. — *From STATUS AND LIFE HISTORY OF THE AMERICAN CROCODILE IN BELIZE. Executive Summary, Final Project Report to UNDP Global Environmental Facility, Belize Coastal Zone Management Project BZE/92/G31. Steven G. Platt and John Thorbjarnarson. Wildlife Conservation Society, 185th St. & Southern Blvd., Bronx, New York NY 10460, USA.*

## Costa Rica.

BIRTH OF AMERICAN CROCODILES IN CAPTIVITY. After several years working on artificial incubation of eggs collected from the wild as part of the research project entitled "Management and Conservation of Crocodiles in Costa Rica" of the School of Biological Sciences at the National University, we have produced and maintain 9 females and 3 males at the LAGAR-TICO crocodile farm in Jacó, Puntarenas, in Costa Rica. For the second consecutive year these have successfully bred, laid and hatched live young in captivity.

The eggs were collected two days after they were laid in nests constructed in sand. a total of 146 eggs were collected from 5 nests and artificially incubated at the ranch at an average temperature of 30.3°C. The average number of eggs per nest was 29. The largest clutch had 33 eggs and the smallest had 24. Of all the eggs, 22.6% were found to be infertile, 36.9% had prenatal mortality and 2.0% showed postnatal mortality. The percentage hatching was 40.4% for a total of 59 live hatchlings of which 56 survive, a survival of 94.5%. These eggs hatched during April and May 1997. The average length and weight of the new hatchlings was 247.7mm and 49.7 g respectively.

This success is very significant in the investigation of crocodiles in Costa Rica, being the first records of hatching under artificial conditions from parent reproducing in captivity. In addition, the analysis of these results suggests the necessity of continuing research on the quality of diet of the adults and improving the precision of temperature control in the incubator as this factor was quite variable due to a lack of financial resources. — Juan J. Sánchez R., Lilliana Piedra C. & Juan R.

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## Dominican Republic

CROCODILE CONSERVATION AT LAGO ENRIQUILLO. Studies on the *Crocodylus acutus* population in Lago Enriquillo have entered their sixth year. At the moment, the results of the last five years nesting are compared. The number of reported nests had gone down to only four in 1992 due to severe human impacts (Sec Newsletter reports 1994, 1995). Since then the number of nests has ranged from 14 in 1995 to 51 in 1996. Three nests were robbed [by people- *Eds*] in 1993 and one in 1995. Since 1996, some crocodiles use nesting beaches which are heavily frequented by tourists, two nests were even found right next to a trail on sandy ground. This shows that we are getting closer to a peaceful co-existence between humans and crocodiles, a result of almost six years of conservation efforts in Lago Enriquillo.

During the last five years a total 192 nests were located. Of the 188 nests not robbed, 79 (42%) were located directly after oviposition and the number of eggs counted. About 75% of the eggs laid were viable ranging from 61% (1993) to 93% (1994). Eight nests with no viable eggs were recorded (six of them in 1996). However, the great majority of nests had fewer than 30% of eggs inviable. There was no nest predation by animals recorded, however, some of the nests with low viability were attacked by ants.

Between 1995 and 1997, seven nests were equipped with data loggers (Hobotemps and Tidbits), which measured nest temperature every hour for a period of 2-3 months. During the first half of incubation, the temperature of the seven nests ranged from 30.4° - 32.0°C (mean 31.2°C). In the second half of the incubation period, mean nest temperature was 32.4°C. Nest temperatures appear to depend more on the depth of the nest than on the presence or absence of shade. Nest humidity [soil water content?-*Eds*.] measured in 50 nests ranged between 2.5% and 15% water content.

These studies and conservation activities were carried out by several institutions in a joint program: Departamento de Vida Silvestre DR, Servicio Alemán de Cooperación Social-Technica

and Dirección Nacional de Parques DR. Funding was provided by the Wildlife Conservation Society and the Swiss agency for Cooperation (HELVETAS).

In 1996, Lago Enriquillo was decreed a National Park. However, in July 1997, a decree by the new government removed the National Park status. At present there is a discussion between Dominican conservation interests and the government trying to find a solution for what should happen to the protected area system, including Lago Enriquillo. -- Andreas Schubert, *Helige Aue 3, 3173 Grunenplan, Germany.*

## Guatemala

CROC STUDIES PLANNED. I am planning a watershed analysis/habitat mapping project for the Sierra de los Cuchumantanes. The project will include wildlife/ecological surveys, monitoring physical components and mapping terrestrial and river habitats. The project is part of a program to provide Geographic Information Systems capabilities for the Mayan Forestry Action Plan, a non-government organization concerned with deforestation and self-determination for the Maya-chuj people.

The Sierra de los Cuchumantanes is an enormous mountain range rising from the southwest corner of the Peten to more than 12,000 feet above sea level. The watersheds of this mountain range drain nearly 800,000 acres of national and private lands into the Usumacintos and Grijalva river system. This is an ecologically important region believed by scientists on Guatemala's council of protected areas to be the country's most biologically diverse habitats. Despite this recognition, unsustainable logging and slash-and-burn agriculture continues to compromise the native habitats of this region.

The overall project provides information and support for PAF-MAYA's preparation of GIS coverages from existing hard copy maps and data sets; and 'on site' characterization of the region's native habitats. The program is intended to assist PAF-Mayan defining and planning conservation units that build on local Maya-chuj culture and their vision for the future.

An important project component will be determining species that indicate changes between intact habitats. Complimentary to defining the region's ecological settings is identifying the organisms that use these locations. I would like to

include a distribution survey and ecological characterization of Morelet's crocodiles as part of a biological description of this region

These data will identify intact ecologies that can serve as refugia and negative controls as part of a sustainable management plan for the Maya-chuj. The results will also document the history and extent of habitat loss, facilitate design and monitoring of reforestation and restoration of impacted habitats and establish base line data for monitoring impact of climate change on these ecosystems.

According to the executive summary of 'Crocodiles: an Action Plan for their Conservation' (1992), published on the Crocodile Specialist Group's web page, Morelet's crocodile (*Crocodylus moreletii*) is among the seven most critical species in terms of need for conservation. The CSG's status survey and conservation action plan hierarchical list of projects identifies the need for "status surveys and development of conservation and management programs" for Morelet's in Guatemala.

The habitat of *C. moreletii* is usually described as freshwater marshes, swamps, ponds and lagoons. However, I have observed a Morelet's crocodile in the Guacamayo river of Belize, between Mountain Pine Ridge and an area called the Chicibol. The gradient of the river at this location is much steeper than that of marshes and lagoons, though there were many long pools. While it would not be surprising to find Morelet's at the lower elevations of the Sierra de los Cuchumantanes adjacent to the Peten and in Laguna Yalnobaj, my previous observations in steeper gradients leads me to believe that these crocodiles may be found at considerably higher elevations. -- David S. Kossack, P.O. Box 268, Davenport CA 95017, USA.

## Mexico

OBSERVACIONES TÉCNICAS SOBRE COCODRILOS EN LAGUNAS DE CHACAHUA, OAXACA. Con la inquietud de proteger y conocer sobre los crocodilios en México se promueven e inician por los años 70's varios estudios y proyectos de conservación y reproducción, entre uno de ellos esta el Centro de Reproducción de Cocodrilos "Lagunas de Chacahua", Oaxaca en costa Pacifico Sur Oeste del Mexico. Iniciado sus operaciones con un lote de 40 ejemplares de *Crocodylus moreletii* provenientes del Zoologico de Atlanta,

Georgia, USA. A partir de 1982 se logra la reproducción de estos ejemplares y desde entonces hasta 1994 se han estado reproduciendo en cautiverio.

Desafortunadamente este proyecto por ser apoyado por el gobierno no recibió los suficientes fondos para poder mantener en optimas condiciones sus instalaciones ocasionando que los ejemplares que se encontraban en un acuaterario en semicautiverio se incorporaron al sistema lagunar principal. Siendo el cocodrilo de pantano un especie introducida y formar parte del sistema lagunar natural [y en el rango de *C. acutus*-Eds] se inicia un problema ecológico como es reportado por Sigler en 1989 y Ross en 1995.

Preocupados por la situación la Dirección General de Vida Silvestre y Cocodrilos de Chiapas inicia un programa de monitoreo y extacción de la población tanto en cautiverio como introducida en la laguna. Se realizaron monitoreos nocturnos en Marzo y Mayo pudiendo verificar que las poblaciones tanto de *C. acutus* se encuentran muy afectadas, solo se pudieron detectar en una zona conocida como Pozo de Agua Dulce observando 7 crías de *C. acutus* y 4 adultos muy ariscos para poder acercarnos para determinar la especie. Tambien se detectaron dos zonas de nidificación en el lugar. La población local ha reportado en otros dos lugares la existencia de *C. acutus* los cuales se están revisando, aunque por la ubicación es difícil que exista una población adecuada ya son áreas con mucho transito de embarcaciones y es una zona de pesca. Además se pudo constatar que sigue existiendo una cacería furtiva al encontrar un cementario de cocodrilos, detectando 3 ejemplares de mediano tamaño completamente destruidos los craneos y unicamente quitada la piel.

Para el caso de los *C. moreletii*, se monitorio el área donde se han estado reportando estos ejemplares y solo se pudo observar los ojos de dos ejemplares la primera ocasión y solamente se observo una en las subsecuentes. Además se trato de localizar nidos de la especie sin ningún éxito. Estos resultados a diferencia de lo reportado donde se menciona que existían en el sistema lagunar al menos entre 60 y 80 ejemplares de *C. moreletii* sueltos.

Por lo se concluye es que ambas especies se encuentran en eminente peligro, para el *C. acutus* es necesario restablecer la vigilancia en el parque para evitar la cacería de esta especie y otras asi como evitar la tala de arboles para la venta. Y con el nuevo programa con el *C. acutus* en el Centro de Reproducción de Cocodrilos Lagunas de

Chacahua y repoblando la zona además de un trabajo intenso con la comunidad para involucrarlos en el proyecto de conservación. La zona tiene un gran potencial tanto turístico como de aprovechamiento sustentable por lo que se han tenido pláticas con las comunidades y las autoridades gubernamentales para solicitar apoyo para la zona.

Con respecto al *C. moreletii* su población es mínima, se seguirán con los trabajos de monitoreo y captura de ejemplares para obtener el mayor número de ejemplares para ser reubicados en otros criaderos o liberados en zonas naturales de su distribución. Esta especie creemos que también ha sido fuertemente afectada por la cacería furtiva y por ello haya descendido su población, además de la competencia contra la otra especie y por la alta salinidad de agua hayan buscado otros sitios. Nuestra recomendación es seguir con los monitoreos y captura de todos los ejemplares, así como de un análisis de otros sistemas lagunares para revisar que posibilidades existan de desplazamiento. -- Manuel I. Muniz, David Montes Cuevas & Arnulfo Hernández de Luna, *Cocodrilos de Chiapas*, Apto. Postal 41-601, Lomas de Chapultepec, México DF, 11000 México.

TECHNICAL OBSERVATIONS OF CROCODILES IN CHACAHUA LAGOONS, OAXACA. Concerned about the uncertain protected status of crocodiles in Mexico, a number of projects were initiated during the 1970's for their conservation and captive breeding. Among these was the 'Lagunas de Chacahua Center for Crocodile Breeding' in Oaxaca, on Mexico's SW Pacific coast. Operations were begun with 40 specimens of *Crocodylus moreletii* obtained from the Atlanta Zoo, USA. By 1982, these specimens were breeding and they have bred in captivity until around 1994. Unfortunately, although approved by the government, the project never received sufficient funds to keep its installations in optimum condition. Occasionally individuals held in a semi-natural enclosure have escaped into the nearby coastal lagoon system. It was thought that the introduction of *C. moreletii* into a natural ecosystem outside its range [and in the range of *C. acutus*-- Eds.] might create ecological problems as reported by Sigler in 1989 and Ross in 1995. Concerned about this situation, the Directorate General of Wildlife and Crocodiles de Chiapas (a private company) began a program of monitoring

and removal of animals from this introduced population back into captivity.

Nocturnal surveys were undertaken in March and May 1997 which were able to verify that the population of *C. acutus* is heavily impacted. We were only able to see seven hatchlings in an area called Freshwater Springs, and four extremely wary adult crocodiles were seen, but could not be approached closely enough to identify the species. We also found a nesting area nearby. Local informants reported two additional places where *C. acutus* exist, although the team considered it very difficult to maintain an adequate population in this area which has a heavy traffic of boats and fishing. We were also able to deduce that there is illegal hunting of crocodiles as we found a cemetery of crocodile bones with three medium sized specimens in which the skulls were completely destroyed and each had the skin removed.

In the case of *C. moreletii*, we monitored the area where these were reported to occur but only saw the eyeshines of two individuals the first time we went there and one more subsequently. We were completely unsuccessful at finding signs of nesting of this species. Our results are very different from reports which mention 60 to 80 specimens of *C. moreletii* loose in the lagoon system.

From this, we conclude that both species are immediately threatened. For *C. acutus* it is necessary to re-establish enforcement in the protected area to reduce illegal hunting, as well as the illegal removal of timber for sale. It is also necessary to develop a new program at the Laguna Chacahua Crocodile Reproduction Center and repopulate the area with the native *C. acutus*, as well as developing an intensive program with local communities to involve them in conservation. The area has great potential for tourism and sustainable harvest and discussions are underway with local communities and government authorities to obtain approval of these activities in the area.

The population of *C. moreletii* is very small. Work will continue to monitor this population and try to remove as many specimens as possible for transfer to other captive situations, or to reintroduce them back to areas in their natural distribution. We believe this species has also been strongly affected by illegal hunting, which has greatly reduced the number of free-living specimens. In addition, competition with the native *C. acutus* and the high salinity of the water,

may have caused them to seek out other areas. Our recommendation is to continue the monitoring and capture attempts as well as to look at other lagoon systems to consider the possibility that the introduced animals have relocated. -- *Free translation of the preceding article.*

## TRADE



US REGULATIONS COMPLY WITH UNIVERSAL TAGGING. To comply with the requirements of CITES Res. Conf 9.20 on Universal Tagging of crocodylian skins, the US CITES Management Authority and Fish and Wildlife Service Port Inspection offices are now requiring that the tag numbers for American alligators on permits/skins that are sent back to the U.S. match up with the permits referenced on the re-export document. Some of the ports are now trying to check and make sure that tags on skins returned to the U.S. were actually listed on the original U.S. CITES export permit, and are referenced on the CITES re-export certificate from the countries of re-export (usually where skins were sent for processing and tanning). In the past, shippers have simply referenced any U.S. CITES permit--regardless of whether or not the particular skins to be exported were included in that document by tag number. Shippers and US importers will need to exercise special care to keep the tag numbers on skins and the numbers on the permits together. -- *From information submitted by Carol Carson, Office of the US CITES Management Authority, 4401 N. Fairfax Drive, Arlington, VA 22203, USA*

## Publications



RECENT PUBLICATIONS 1995-1997. Again, we are grateful to Ms. K. Fleming, editor of *Wildlife Reviews*, for providing a listing of recent

publications covering the period Jan 1995- May 1996. To these have been added additional references to papers sent by CSG members to this office or otherwise coming to the attention of the editors.

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- Plant Conservation Subcommittee-  
<[www.cjb.unige.ch/bvauicn/bplants.htm](http://www.cjb.unige.ch/bvauicn/bplants.htm)>.
- African Elephant -  
<[www.iucn.org/themes/ssc/afesg.html](http://www.iucn.org/themes/ssc/afesg.html)>.
- African Rhino- <[www.rhinos-irf.org/specialists](http://www.rhinos-irf.org/specialists)>.
- Asian Rhino- <[www.rhinos-irf.org/specialists](http://www.rhinos-irf.org/specialists)>.
- Cats- <[www.iucn.org/themes/ssc/ssc-cats\\_home.html](http://www.iucn.org/themes/ssc/ssc-cats_home.html)>.
- Lagomorph- <[www.scar.utoronto.ca/~hik/lsg](http://www.scar.utoronto.ca/~hik/lsg)>.
- Tapir- <[www.tapirback.com/tapirgal/iucn-ssc/tsg/](http://www.tapirback.com/tapirgal/iucn-ssc/tsg/)>.
- Wolf- <[www.worlf.org/iucn/index.html](http://www.worlf.org/iucn/index.html)>.
- Crane-  
<[www.baraboo.com/bus/icf/whowhat.htm](http://www.baraboo.com/bus/icf/whowhat.htm)>.
- Megapode- <[www.cns.gu.edu.au/ecology/darryl/megap.htm](http://www.cns.gu.edu.au/ecology/darryl/megap.htm)>.
- Partridge, Quail & Francolin- <[www.game-conservancy.org.uk/pqf/](http://www.game-conservancy.org.uk/pqf/)>.
- Crocodile <[www.flmnh.ufl.edu/natsci/herpetology/crocs.htm](http://www.flmnh.ufl.edu/natsci/herpetology/crocs.htm)>.
- Shark- <[www.flmnh.ufl.edu/fish/research/iucn](http://www.flmnh.ufl.edu/fish/research/iucn)>.
- Sturgeon- <[www.sturgeons.com](http://www.sturgeons.com)>.
- Social Insect- <[research.amnh.org/entomology/social\\_insects](http://research.amnh.org/entomology/social_insects)>.
- Conservation Breeding - <[www.cbsg.org](http://www.cbsg.org)>.
- Reintroduction-  
<[www.regkew.org.uk/conservation/rsgguidelines.html](http://www.regkew.org.uk/conservation/rsgguidelines.html)>.
- Declining Amphibians- <[www.open.ac.uk/ou/academic/biology/j\\_baker/jbtxt.htm](http://www.open.ac.uk/ou/academic/biology/j_baker/jbtxt.htm)>.
- Australian Marsupials & Monotremes- <[www.anca.gov.au/plants/threaten/marsupl.html](http://www.anca.gov.au/plants/threaten/marsupl.html)>.
- Neotropical Primates Newsletter- <[www.primate.wisc.edu/pin/news/psg14.html](http://www.primate.wisc.edu/pin/news/psg14.html)>.
- Threatened Waterfowl Newsletter-  
<[www.greenchannel.org/www/twsg/contents.htm](http://www.greenchannel.org/www/twsg/contents.htm)>.

## CSG ONLINE

NEW URL and E-MAIL ADDRESS. Name: Ed Colijn, E-mail: [edcolijn@noord.bart.nl](mailto:edcolijn@noord.bart.nl), Homepage: The Indonesian Nature Conservation Database URL <<http://www.noord.bart.nl/~edcolijn/>>.

AG KROKODIL. A crocodile conservation group in Germany coordinated by Tim Weigmann has created a page in German at <<http://www.dght.de/krokodil.htm>>.

SPECIALIST GROUPS WITH WEB SITES. Specialist Group information and hyperlinks can be obtained from the SSC home page at <<http://www.iucn.org/themes/ssc/index.htm>>. The following are direct contacts to SSC websites.

## MEETINGS

### 14th Working Meeting.

MEETING PREPARATIONS PROGRESS. The venue of the 14th Meeting will be Singapore International Convention & Exhibition Centre, 1 Raffles Boulevard, Singapore 039593. A preliminary registration form is included in this Newsletter and individuals wishing to obtain detailed information about the meeting are urged to return the form by any means to the meeting organizers, Foreword Communications, in Singapore. Foreword

Communications have moved their office from North Bridge Center to Purvis Street in Singapore, but materials addressed to Northbridge as well as to the current address, will be received. Fax, phone and e-mail remain unchanged.

Foreword Communications, 26A Purvis Street,  
Singapore 188603  
Republic of Singapore  
Fax 65 338 5917 Or 65 339 4708, E-mail  
<foreword@singnet.com.sg>

The organizers have also developed arrangements for accommodation near the Convention Center for a range of prices between \$72 and \$168 US/night. Hotels are also available within easy reach by public transport for as little as \$35- \$45 US/night.

A program committee comprising of Perran Ross, Choo Hoo Giam, Val Lance, John Thorbjarnarson, Grahame Webb, Lehr Brisbin, Alan Woodward, Ruth Elsey and Kevin Van Jaarsveldt are in communication by e-mail and developed a preliminary program outline which appears below. Several speakers on the program still need to confirm their attendance, but the program is already shaping up to be a dynamic discussion of current issues in crocodile conservation with emphasis on the Asian region.

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14TH WORKING MEETING OF THE CROCODILE  
SPECIALIST GROUP  
PROVISIONAL PROGRAM

Tuesday 14 July

Opening ceremony

Welcome address by SRSTA

Address by Chairman, CSG

Speech by guest-of-honour

Refreshments/break

Session 1. Conservation of critically endangered crocodiles in S.E. Asia, moderator G. Webb

Introduction. Quantifying Status/Basic Biology of crocodilians, *Tomistoma* in Malaysia (Sarawak) , *Tomistoma* in Malaysia (Peninsula), *Tomistoma* in Thailand, *Tomistoma* in Indonesia, *Alligator sinensis* in China, *Crocodylus mindorensis*  
Questions and discussion.

Session 2. Application of IUCN Listing Criteria to S.E. Asian species. moderator Perran Ross.

Working session to determine current status of Asian species.

18.00-20.00 Welcome cocktail party

Wednesday 15 July

Session 3. Impacts of contaminants on crocodilian populations, moderator L. Brisbin. Introduction to the topic, Principles of contaminant movement, Genetic effects of contaminants, Recent contaminant effects in Florida, Behavioural interactions with chemicals, Discussion.

12.00-14.00 Lunch

Session 4. Evaluation of reintroductions of crocodilians as a conservation tool, moderator R. Elsey

Introduction to reintroductions P. Soorae, SSC Reintroduction Specialists Group, presented papers to be determined.

Questions and discussion

Thursday 19 July

Session 5 Developments in conservation of crocodilians in S.E. Asia, moderator J. Thorbjarnarson.

Case studies and reports, Vietnam, Cambodia, China, Thailand

Questions and discussion.

12.00-14.00 Lunch

Session 6. Physiological basis of crocodilian reproduction in captivity, moderator V. Lance. Speakers to be announced.

Friday 20 July

Session 7 Trade and World skin markets moderator K. van Jaarsveldt

Factual reports on current trade dynamics, major regions of production and processing followed by a panel discussion of current events and responses

12.00-12.30 Closing ceremony

1300-Field trip , to be announced.

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The program is designed around sessions assembled by the moderators and based on a small number of speakers who will present general papers from which discussion by panelists and the audience will be developed. Short technical presentations and general papers will be presented as posters and a call for Posters follows.

SECOND WESTERN ASIAN REGIONAL MEETING. 2-4 July 1998. Madras Crocodile Bank Trust, Mammalpuram, Tamil Nadu, India. Following the resoundingly successful meeting held in 1997. Indian crocodile researchers invite their colleagues from the region and elsewhere to join them in Madras for a second meeting to continue the development of a regional strategy and to share information and recent results. The organizers urgently would like to hear from people interested in attending the meeting. For further information and details on hotels, local transport etc. please immediately contact -- Romaine Andrews, *Projects Coordinator, Center for Herpetology, Madras Crocodile Bank Trust, Post Bag No. 4, Mammalpuram 603 104 TN, India, phone 91 41 144 6332, fax 91 44 491 0910/91 41 144 2511.*

## ANNOUNCEMENTS

**FUNDING OPPORTUNITY.** The Center for Field Research invites proposals for 1998-99 field grants funded by its affiliate Earthwatch. Earthwatch is an international non-profit organization dedicated to sponsoring field research and promoting public education in the sciences and humanities. Projects are acceptable in a wide range of disciplines, including animal behavior, ecology, endangered species, herpetology and resource and wildlife management. Several projects on crocodylians have been supported in the past. Information can be found at <http://www.earthwatch.org/cfr/cfr.html> or contact -- The center for Field Research, 680 Mt. Auburn St. Watertown MA 02272, USA fax 617 926 8532, e-mail [cfr@earthwatch.org](mailto:cfr@earthwatch.org)

**X-RAY RESEARCH FACILITIES AVAILABLE.** X-ray facilities consisting of plain film imaging, cinematography, fluoroscopy, videotape, digital subtracting imaging and ultrasound for experimental and research imaging of animals and in-vitro studies are available in the Radiology Research Laboratory at the Gainesville V.A. Medical Center. Veterinary anesthesia and other veterinary care is also available. The laboratory has facilitated several crocodylian studies. For further information contact -- Christopher R.J. Mladinich, *Assistant research Scientist, 100374 Radiology Dept. University of Florida, Gainesville FL 32610 USA*

## PERSONALS



The CSG Chairman, Professor H. Messel, has retired as Chancellor of Bond University on the expiration of his contract with Bond

in December 1997 and will revert to his position as Emeritus Professor, School of Physics, University of Sydney, Australia. as his institutional base for his continuing activities in conservation. Professor Messel expresses his thanks to CSG members for their understanding and support while he has effectively occupied two full time positions (while being officially retired!). He looks forward to focussing his energies again in the conservation sphere. In the meantime, during January, Prof. Messel is taking his annual walking and fishing holiday in Tasmania. Routine communications should be directed to the CSG Executive Officer while urgent and personal communications may be sent to him at School of Physics, University of Sydney, Sydney 2006, Australia fax 612 9 351 7726 .

Dr. Luis Pacheco, <[cdc@tropico.rds.org.bo](mailto:cdc@tropico.rds.org.bo)> has completed his PhD and defended his dissertation at the University of Chile in December. Lucho will return to his native Bolivia.

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

# 14th Working Meeting of the Crocodile Specialist Group

## SINGAPORE 14 - 17 July 1998

The Singapore Reptile Skin Trade Association, hosts of the 14th Working Meeting of the Crocodile Specialist Group, cordially invite participants to indicate their interest in attending this meeting by returning the form below as indicated. Your earliest indication of intention to attend the meeting is requested to assist the organizers make suitable preparation for facilities for the meeting.

The meeting will structured around several invited keynote addresses and take the form of open workshops and discussions over three days of the meeting. An additional half day will be scheduled for local field trips. General reports and scientific results will be presented in poster sessions. Registration for the meeting is \$120.00 US per person if received prior to 15 March 1998 and \$150.00 per person if received after that date.

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To receive registration materials and detailed information on bookings, hotel accommodations and other activities associated with the meeting please return the information requested below by mail, fax or electronic mail to:

Foreword Communications, 26A Purvis Street, Singapore 188603  
Republic of Singapore \*

Fax 65 338 5917 Or 65 339 4708, E-mail [foreword@singnet.com.sg](mailto:foreword@singnet.com.sg)

<b>PREREGISTRATION FORM - 14th Working Meeting of the Crocodile Specialist Group</b>		
<b>Name</b>	.....	
<b>Institution/Company</b>	.....	
<b>Postal address</b>	.....	
	.....	
	.....	
	.....	
<b>Telephone</b>	<b>Fax</b>	<b>E-mail</b>

\* Note New mail address for Foreword Communications for all meeting related material.

# 14th Working Meeting of the Crocodile Specialist Group

Singapore 14-17 July 1998

## Call for presentations (Posters)

Following discussions at the 13th Working Meeting of the CSG in Argentina, the CSG Steering Committee considered the value of changing the format of the next (14th) Meeting to a format that would encourage broader consideration of key issues and generate general discussion during the meeting. The program committee has assembled and taken the responsibility to coordinate such sessions based around a small number of invited speakers who will present general results and information which will form the basis of discussion by the presenters, panels and the general audience. It is hoped that this format will encourage focused discussion of current issues in crocodylian conservation. However, we recognize the great value of receiving reports on technical advances, short reports on field projects, recent research results and similar short communications. To achieve this we call here for submissions to present such information in the form of posters to be displayed at the meeting venue. Posters should be accompanied by a written abstract which will be incorporated into the Meeting Proceedings.

To apply to present a poster, send the following information on a single page to:

Dr. J. P. Ross  
Florida Museum of Natural History  
Gainesville FL 32611 USA  
fax 1 352 3929367, e-mail [prosscsg@flmnh.ufl.edu](mailto:prosscsg@flmnh.ufl.edu)

**Author(s) name(s).**

**Address for correspondence** (e-mail preferred)

**Title of the presentation**

**Abstract.** On the remainder of a single page, a brief description of the work to be presented.

Authors submitting presentations before 31 March 1998 will be advised of the acceptance of their posters by 15 April. Submissions received after 31 March will be accepted on a space available basis. General instructions to poster authors follow:

Posters are displays of project reports, research results, photographs, commercial presentations and similar material presented fixed to a vertical surface for viewers to inspect and read. Each poster will be allocated a vertical space of approximately 2m x 1.5 m

Authors should come to the meeting fully prepared to assemble their poster materials. This means text, pictures, labels tables etc. should already be printed in full size format for presentation. Authors should not expect to copy, enlarge, type, print or otherwise prepare their materials at the meeting unless they have made their own arrangements to do so. Authors should bring their own adhesive tape and drawing pins to fix their material to boards which will be provided. Materials may be presented as video, computer or slide show but authors should arrange all the equipment they need, including projectors and screens.

Posters can follow standard scientific presentation order (Title, Abstract, Methods, Results, Discussion, Literature cited) or another format may be used. Title text should be 25 cm (1") = 72 point type or larger. The larger the text, the easier for viewers to read and understand. All major headings, figure captions and labels should be easily read by a normal sighted viewer situated 3 m (10 feet) distant. Photographs, drawings and clear graphs are highly effective and preferable to dense text.

## Steering Committee of the Crocodile Specialist Group

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

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

**Deputy Chairmen (New World): Prof. F. Wayne King**, Florida Museum of Natural History, Gainesville, FL 32611, USA. Tel: (1) 352 392 1721 Fax: (1) 352 392 9367. <kaiman@flmnh.ufl.edu>

**(Old World) Dr. Dietrich Jelden**, Bundesamt für Naturschutz, Konstantin Str. 110, D-53179 Bonn, Federal Republic of Germany. Tel: (49) 228 954 3435 Fax: (49) 228 954 3470.

**Africa: Vice Chairman: Dr. Jon Hutton**, 16 Cambridge Ave., Highlands, Harare, Zimbabwe. Tel: (263) 473 9163 Fax: (263) 473 1719. Deputy Vice Chairman: Olivier Behra, Univers Tropical, 14 rue de la Mairie, 28.000, Chartres, France. Tel: 33 23 736 8198 Fax: 33 23 736 8198

**Eastern Asia, Australia and Oceania: Vice Chairman: Dr. Grahame J.W. Webb**, P.O. Box 530, Sanderson, NT 0812, Australia. Tel: (61 8) 8 999 2355 Fax: (61 8) 8 947 0678. Dr. Robert Jenkins, Australian National Parks & Wildlife, Australia. Mr. Paul Stobbs, Mainland Holdings, Papua New Guinea. Koh Chon Tong, Heng Long Leather Co., Singapore. Dr. Yono C. Raharjo, Research Institute Animal Production, Indonesia. Dr. Parntep Ratanakorn, Wildlife Research Laboratory, Dept. of Zoology, Kasetsart University, Thailand. Dr. Choo Hoo Giam, Dept. Primary Industry, Singapore.

**Western Asia: Vice Chairman: Romulus Whitaker**, Madras Crocodile Bank, Post Bag No. 4, Mamallapuram 603 104 Tamil Nadu, India. Fax: (91) 44 491 0910. Deputy Vice Chairman: Dr. Lala A.K. Singh, Project Tiger, Similipal Tiger Reserve, Khairi-Jashipur, Orissa, India 757091. Harry Andrews, Madras Crocodile Bank, India.

**Europe: Vice Chairman: Dr. Dietrich Jelden**, Bundesamt für Naturschutz, Federal Republic of Germany. Richard Luxmoore, World Conservation Monitoring Centre, U.K.

**Latin America and the Caribbean: Vice Chairman: Alejandro Larriera**, Bv. Pellegrini 3100, (3000) Santa Fe, Argentina. Tel: (544) 262 352 Fax: (544) 255 8955. <yacare@unl.edu.ar>, Deputy Vice Chairman: A. Velasco B. PROFAUNA, Ed. Camejo, Entrada Oeste, Mezzanina, Centro Simon Bolivar, Caracas 1010, Venezuela. Fax: (582) 545 3912. <profauna@dino.conicit.ve>. Aida Luz Aquino, Oficina de CITES-Paraguay, Paraguay. <laquino-cites@see.cnc.una.py>. Lic. M. Quero P.

PROFAUNA, Venezuela. Dr. Miguel Rodriguez, Pizano S.A., Colombia.

**North America: Vice Chairman: Ted Joanen**, Route 2, Box 339-G, Lake Charles, LA 70605, USA. Tel: (1) 318 598 3236 Fax: (1) 318 598 4498. Deputy Vice Chairman: Dennis David, Florida Game & Fresh Water Fish Commission, 4005 S. Main Street, Gainesville, FL 32611, USA. Tel: (1) 352 955 2230 Fax: (1) 352 376 5359. Deputy Vice Chairman: Dr. Ruth Elsey, Louisiana Wildlife and Fisheries Commission, 5476 Grand Chenier Way, Grand Chenier, LA 70643, USA. Tel: (1) 318 538 2165 Fax: (1) 318 491 2595.

**Science: Vice Chairman: Dr. Valentine A. Lance**, San Diego Zoo, P.O. Box 551, San Diego, CA 92112, USA. Tel: (1) 619 557 3944 Fax: (1) 619 557 3959. Deputy Vice Chairman: Dr. John Thorbjarnarson, Wildlife Conservation Society, 185 Street & Southern Blvd. Bronx, NY 10460, USA. Tel: (1) 718 220 5155 Fax: (1) 718 364 4275. <jcainan@aol.com>. Deputy Vice Chairman: Prof. I. Lehr Brisbin, Savannah River Ecology Lab, Aiken, SC 29802 USA. Tel: (1) 803 725 2475 Fax: (1) 803 725 3309.

**Trade: Vice Chairman: Kevin van Jaarsveldt**, P.O. Box 129, Chiredzi, Zimbabwe. Tel: (263) 31 2751 Fax: (263) 31 2928. Deputy Vice Chairman: Mr. Y. Takehara, Japan Leather & Leather Goods Industries Association, Kaminarimon, 2-4-9, Taito-Ku, Tokyo 111, Japan. Tel: (813) 3 865 0966 Fax: (813) 3 865 6446. Deputy Vice Chairman: Don Ashley, Ashley Associates, P.O. Box 13679, Tallahassee, FL 32317, USA. Tel: (1) 904 893 6869 Fax: (1) 904 893 9376.

**Trade Monitoring: Vice Chairman: Stephen Broad**, TRAFFIC International, 219 Huntingdon Rd Cambridge CB3 0DL UK. Tel: 44 122 327 7427 Fax: 44 122 327 7237. Lorraine Collins, WCMC, 219 Huntingdon Rd Cambridge CB3 0DL UK. Tel: 44 122 327 7314 Fax: 44 122 327 7136. Marco Pani, CITES Secretariat, Switzerland.

**Ex Officio: IUCN: Species Survival Commission Chairman: Mr. David Brackett**, Canadian Wildlife Service, Hull, Quebec K1A 0A3, Canada. Bernardo Ortiz von Halle, IUCN-America del Sur, Ecuador. CITES Observers: Dr. James Armstrong, Asst. Secretary General, Dr. Obdulio Menghi, Scientific, CITES Secretariat, P.O. Box 456, CH-1219, Chatelaine, Geneva, Switzerland.

